STATE OF NEW JERSEY DEPARTMENT OF THE TREASURY DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ENERGY





REMEDIAL CONSTRUCTION COMBE FILL SOUTH LANDFILL SUPERFUND SITE

CHESTER AND WASHINGTON TOWNSHIPS MORRIS COUNTY, NEW JERSEY

FEBRUARY 1992

IFB No. X-25633
SUPPLEMENTAL INFORMATION
SITE DATA





COMBE FILL SOUTH LANDFILL SUPERFUND SITE REMEDIAL CONSTRUCTION

VOLUME 3

SITE DATA

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

FEBRUARY 1992

O'BRIEN & GERE ENGINEERS, INC. 5000 BRITTONFIELD PARKWAY SYRACUSE, NEW YORK 13221

INTRODUCTION

Chemical data on ground water and soil at and near the site, the results of test pits and soil borings conducted for purposes of design, and access road cross sections are contained in this document.

It shall be the Contractor's obligation to satisfy himself as to the nature, character, quality and quantity of subsurface conditions likely to be encountered. Any reliance upon the subsurface information, chemical data, and other information in this document or otherwise made available by the State or the Engineers shall be at the Contractor's risk. The Contractor agrees that he shall neither have nor assert against the State or Engineer any claim for damages for extra work or otherwise or for relief from any obligation of this Contract based upon the failure by the State or Engineer to obtain or to furnish additional subsurface or chemical information in the State's or Engineer's possession or based upon any inadequacy or inaccuracy of the information furnished; provided, however that the Contractor may be entitled to an adjustment in the contract price under the circumstances and to the extent provided in Articles 12 and 13 of the General Conditions.

Certain subsurface and chemical information may be shown on separate sheets or otherwise made available by the State or Engineer to Bidders, Contractors, and other interested parties. The information contained in this document shall not be considered a part of the Contract Documents or Contract Drawings, it being understood that this information is made available only as a convenience, without express or implied representation, assurance, or guarantee that the information is adequate, complete, or correct, or that it represents a true picture of the subsurface and chemical conditions to be encountered, or that all

pertinent subsurface information and chemical data in the possession of the State or Engineer has been furnished.

It shall be the obligation of the Contractor to inquire of the State and Engineer whether pertinent subsurface information and chemical data has been obtained by the State with respect to the work.

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Proposed Access Road Cross Sections

I. Gas Sampling Report

OBRIEN & GERE

Memorandum

To: John Keegan

From: R.M. Rybinski

RMR

Subject: Combe Landfill, New Jersey

Gas Sampling

Date: 2/23/89

File: 3013.012

Copies: R.D. Jones

S.W. Anagnost A.J. Caracciolo

S.J. Roland

O'Brien & Gere Engineers, in connection with Scott Environmental Technology, Inc., Plumsteadville, PA., sampled landfill gas at the Combe Landfill South, Chester, New Jersey, from February 13 to February 16, 1989. The field personnel from O'Brien & Gere were John Knox, Scott Magee and Tom Bold from the Edison office and this writer from the Syracuse office. Scott Environmental personnel were Jeff Poiron and Todd Breuer.

On February 13, 1989, Scott Magee and myself arrived at Combe Landfill at 10:00 A.M. We set up one of the blower assemblies on gas monitoring Well GT-1 based on information obtained 2/8/89 on the passive gas flow of Wells GT-1 and GT-2. The blower assembly consisted of PVC piping ranging from 4" to 2", a pitot tube mounted inside 3" PVC piping, a Rotron DR-202R regenerating blower with a remote drive 1 hp. 3450 RPM explosion proof electric motor with adjustable pulleys to vary the flow rate from approximately 20 to 60 CFM, a 55 gallon Carbtrol carbon filter and various fittings to sample the percent methane, the differential and direct pressure, the temperature, and the pumping rate. The instruments used were: Bacharach Gas-Pointer Model H combustible gas indicator for measuring the percent methane in the gas; Solomat Meter for measuring temperature, pressure, differential pressure, and air velocity; Dwyer inclined manometer for differential pressure and pressure; and an Ashcroft gauge for direct pressure reading of the regenerative blower. Power for the blower was from a 3500 watt generator.

At 2 P.M., Gas Monitoring Well GT-2 was connected passively to the carbon filter without the regenerative blower. Passive pressure readings were at 0.06 to 0.07 inches of water with methane readings of 40%. There was not a detectable flow rate of gas with the carbon filter connected.

At 6:00 P.M., GT-2 was connected to a regenerative blower to increase the flow rate.

Wells GT-1 & GT-2 were monitored for the following variables:

% Methane - Measured at the well in the 3" PVC elbow that threaded onto the well. Measured in percent methane to total volume of gas.

Differential Pressure - Measured with a pitot tube in a length of 3" PVC pipe. Measured in inches of water.

Total Pressure - Measured with a pitot tube and measured in inches of water

SAMPLING AND ANALYSIS OF LANDFILL VENTS ON COMB SOUTH LANDFILL

Prepared for:

O'Brien & Gere Engineers, Inc. 1304 Buckley Road Syracuse, NY 13221

June 1989

SCOTT ENVIRONMENTAL TECHNOLOGY, INC. Plumsteadville, Pennsylvania 18949

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1.0 INTRODUCTION

On February 16, 1989, Scott Environmental Technology, Inc. initiated the landfill vent sampling program of Comb South Landfill located in Morris County, New Jersey, by source samping two pre-selected vents. The objective of this program was to analyze the air samples for the parameters pre-selected by O'Brien & Gere and the New Jersey Department of Environmental Protection (NJDEP). For the exact listing of analytes, refer to Table 4-1.

It is anticipated that with this data, a successful remedial design for this landfill can be prepared.

The following report includes sampling and analytical procedures involved with this program, plus all data derived from the analysis.

2.0 SAMPLING PROCEDURES

Sampling of Comb South landfill consisted of a joint effort by both Scott and O'Brien & Gere engineers. Two (2) Scott field technicians were directed to the sampling site which consisted of two (2) 4" PVC well vents that were in the process of being evacuated by a pumping system which was driven by an electric generator.

Each well vent had a quarter-inch nipple perpendicularly placed approximately 3-4 feet above the ground on the PVC vent. The Scott crew proceeded to attach a Teflon sampling line to the nipple and to a Teflon lined pump which also operated off of O'Brien & Gere's generator. The pump was calibrated to deliver 5-6 L/min per bag set.

Sampling commenced by the filling of 250 L tedlar bags. Six discreet samples per vent, such large volumes were necessary to accommodate and facilitate the Quality Control/Quality Assurance program on the samples drawn. Please note the times sampled on Table 2-1.

During the vent sampling, Scott field technicians also used a United Technologies Bacharach Sniffer 301 combustible gas indicator to gauge the lower explosion limit of both the general area and directly out of the pump exit. Results can also be seen in Table 2-1.

Once sampling was completed and the samples arrived at Scott's Laboratory, sample preparation took place to increased sample holding times for certain parameters that were requested.

The sample preparation consisted of a simple transfer. The sample in the tedlar bag was forced onto and trapped on a sorbent media. This resin is able to bind low level volatiles and hold them for a period of six to eight weeks. The resin, which is contained in a glass tube, is then ready for analysis.

All other samples were analyzed by direct injection. Refer to Section 3.0 for greater detail.

TABLE 2-1

FIELD DATA

2/16/89

Vent Well Bag Sample ID ID		Time Sampled	Comments				
GT-1 GT-1	GT-1 #1, #2	9:30-11:40					
GT-1	GT-1 #3, #4 GT-1 #5, #6	12:45-15:20 15:40-18:00					
GT-2	GT-2 #1, #2	12:30-14:45	Bag GT-2 #2 Lost in wind				
GT-2	GT-2 #3, #4	15:00-17:05					
GT-2	GT-2 #5, #6	18:30-20:30					

COMBUSTIBLE GAS INDICATOR (SNIFFER 301)

	General Area	Directly Out Of Pump Exit
GT-1	6-8% LEL	> 100% LEL
GT-2	4-5% LEL	> 100% LEL

Samplers: Jeff Potron

Todd Breuer

3.0 ANALYTICAL PROCEDURES

Sampling and analysis was performed as specified in CFR 40, Part 60, Method 18, Measurement of Gaseous Organic Compound Emissions by Gas - Chromatography and in EPA-600/4-84-041 (PB87-168688), Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air.

The permanent gases (N_2 , O_2 , CO_2 , CO_3 , CO_4) were analyzed utilizing a gas chromatograph (GC) equipped with a thermal conductivity detector. Since the presence of these compounds is normally in the percent concentration range, this system is appropriate for these samples. The samples were directly injected onto the GC column, 60/80 Molecular Sieve $5A^3$ x 1/8" SS, via a heated gas valve equipped with a 5cc sample loop. Scott certified calibration gases were used as the standards for determining the concentrations of the gases in the samples.

The analysis of the total chlorinated volatile organic compounds (TVC1) was performed by a GC equipped with an electron capture detector. The sample was introduced directly onto the GC column (0.1% SP-1000, Carbo-pack C 80/100 6' x 1/8" SS) via a heated gas sample valve equipped with a 5cc sample loop. The total TVC1 was calculated by totaling the area counts observed, and subtracting out any area counts contributed by the methane, and comparing the results to a certified gas standard of methylene chloride. The results of the TVC1 are reported in ppm as methylene chloride. Analysis of the samples in this manner provides a worst case situation, since all of the peaks reported were considered as chlorinated when, in fact, they may be brominated, fluorinated, todinated, and/or oxygenated.

The analysis of total mercaptans/hydrogen sulfide (H₂S) was performed by GC equipped with a flame photometric detector in the sulfur mode. The sample was introduced directly onto the GC column, Supelpack-S 30" x 1/8" FEP, via a gas sample valve equipped with a 5cc FEP sample loop. Scott certified calibration gases were used to determine the concentrations of total mercaptans/H₂S. The results are reported in ppm as H₂S. The total mercaptans observed were at the lower detection limit of the instrument

and since $\mathrm{H}_2\mathrm{S}$ appeared, in most cases, at a quantifiable level, the results were totaled and reported as $\mathrm{H}_2\mathrm{S}$.

Once the direct analysis of the bag samples was completed, a measured volume of each bag was transferred to a sorbent trap. This was repeated two more times, at different volumes, to have a total of three sorbent traps per bag sample. The sample volumes collected were 25 1, 40 l, and 50 l. The traps were then stored in a freezer at $-10^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for a period not to exceed eight weeks.

The analysis of the samples was performed by gas chromatography/mass spectroscopy. Standards of multi-component mixes were prepared to make a three-point calibration curve. On each day of the analysis, a runing calibration standard and a calibration check standard was analyzed to determine if instrument conditions remained stable. See Table 5-1 for tuning criteria.

Listed below are the GC/MS system operating conditions to be used for this program.

Electron Energy 70 eV

Mass Range 35-250 Mass Units

Scan Time 1 sec/scan

Chromatographic Column 12 SP-1000 on Carbopack C

6 ft x 1/8 in. SS

Injector Temperature 200 deg C

Source Temperature 80 deg C

MS Interface Temperature 220 deg C

Carrier Gas, Flow Rate Helium, 30 cc/min

4.0 SUMMARY OF RESULTS

Table 4-1 presents a summary of the results from the bag samples collected. Tables 4-2 through 4-7 are the results of the sorbent tube analysis. Reported in Tables 4-2 through 4-7 are the triplicate analyses performed on each bag collected and submitted to the lab.

The results in Table 4-1 indicate the gases in the in the samples are typical of landfill gases. Please note that sample GT 1-1 has high CH_4 and CO_2 results and low N_2 and O_2 results and by sample GT 1-6 the concentrations of CH_4 and CO_2 were lower and N_2 and O_2 had increased. The samples were not analyzed in numerical order and the bags were not deflated when they had arrived to the lab. It is possible that during sampling, the system used to pull gases from the ground was drawing in air. Unit GT-1 seems to have been effected where GT-2 seems to have been pulling in air during most of the sampling.

The analysis of the sorbent traps for specific volatile components show trace levels of vinyl chloride and methylene chloride. All of the other components were below the method detection limit. The highest concentrations of vinyl chloride appeared in GT 2-1 at 3-5 ppm and methylene chloride appeared in GT 1-5 at 5 ppm. The triplicate analysis of each bag, showed very good agreement, except for the methylene chloride. Methylene chloride is a common laboratory solvent and since it appears inconsistantly in the triplicate analyses, may be considered a lab contaminant.

TABLE 4-1

BAG SAMPLE RESULTS

SAMPLES COLLECTED 2/15/89 - 2/16/89

	mple ID	% CH4	३ ०२	% N2	3 CO2	\$ CO	H2S (ppm)	TVCl (ppm)
==			*****		======	======		
GT	1-1	66.7	2	8	20	< 1	14.9	41.37
GT	1-2	68.7	2	8	21.3	< 1	15.9	44.76
GT :	1-3	48.7	3.4	27.2	21.2	< 1	2.31	18.22
g t	1-4	50	3.2	28.9	17.9	< 1	3.26	36.69
GT :	1-5	46.8	4.9	34	14.3	< 1	1.74	21.12
GT :	1-6	45	4.6	32.5	17.9	< 1	2.5	18.99
				÷			•	•
	2-1	46.7	6.9	39.2	7.2	< 1	0	27.52
GT :	2-3	40.1	6.9	43.4	9.6	< 1	0	19.05
GT 3	2-4	40.1	6.9	43.4	9.6	< 1	0	18.02
GT a	2-5	38.3	9.2	49.4	3.1	< 1	0	16.98
GT 2	2-6	38.3	9.2	49.4	3.1	< 1	0	21.1

 $[\]rm H_2S$ (ppm) - Total Mercaptans/ $\rm H_2S$ reported as $\rm H_2S$.

TVC1 (ppm) - Total Volatile Chlorinated Organics as methylene chloride.

TABLE 4-2
SORBENT TUBE ANALYSIS

		871-1-1	GT1-1-2	3T1-1-3	371-2-1	3T1-2-2	371-2-3
	MOL	Results	Results	Results	Sesults	Results	Pesults
VOA		*******			***		
Acetone	<0.1 ppm	(0.1 gpm	(0.1 ppm	(0.1 pp2	(0.1 spa	(0.1 ppm	40.1 ppa
Senzene		(0.1 ppm	(0.1 ppm	(0.1 ppm	().1 ppa	40.1 ppm	0.1 ppm
3rcmodichloromethane		(0.1 ppa	(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppa	(0.1 ppm
Şromofora		(0.1 pps	(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppa
Bronomethane		(0.1 ppm	(0.1 ppm	(0,1 pps	().1 ppa	10.1 222	().1 ppm
2-Butanone (MEK)		0.1 ppa	(0.1 ppm	(0.1 ppa	70.1 spa	10.1 ppm	<0.1 ppm
Carbon Disulfide		().1 ppm	<0.1 ppm	(0.1 pps	(0.1 pga	0.1 ppm	0.1 pps
Carbon Tetrachloride		().1 ppm	(0.1 ppm	10.1 ppa	():1 pps	(0.1 ppm	().1 ppa
Chiorobenzene		0.1 333	().1 apa	49.1 spa	().1 cca	0.1 222	:0.1 spa
Chloroethane		10.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 apm	0.1 ppn	Out ops
2-Chloroethylvinyl ether		10.1 aga	(0.1 ppm	(0.1 ppm	(0.1 ppa	0.1 ppa	().1 ppm
Chlorofora		40.1 pps	(0.1 ppm	(0.1 pps	(0.1 ppm	0.1 spa	10.1 ppm
Chloromethane		(0.1 ppm	(0.1 ppm	(0.1 ppm	70.1 spa	40.1 ppm	().1 ppm
Dibromochloromethane	<0.1 ppm		(0.1 ppm	(0.1 ppm		0.1 ppa	(0.1 ppm
1,1-Dichlorcethane	. (0.1 ррв		(0.1 ppm	<0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppm
1,2-Dichloroethane	(0.1 ppa		(0.1 ppm		(C.1 ppm	(0.1 ppm	O.1 cpm
1,1-Dithloroethene	(0.1 ppm		(0.1 ppm	(0.1 ppg	(0.1 pgs	(0.1 ppm	(0.1 ppm
trans-1,2-Dichloroethene	(0.1 ppm		(0.1 ppm	(0.1 pps	(0.1 ppm	(0.1 ppm	(0.1 ppm
1,2-Dichloropropage	(0.1 ppm		(0.1 ppm			(0.1 ppm	70.1 ppm
cis-1.3-Dichloropropene		10.1 ppg	(0.1 ppm	(0.1 pps	• •	().1 ppm	C.1 ppm
trans-1,3-Dichloropropene	(0.1 ppm		(0.1 ppa	(0.1 ppm	().i pgm	(0.1 opm	70.1 ppm
Ethyl Penzene		10.1 ppm	(0.1 ppm	(0.1 ppm		70.1 ppa	/0.1 ppm
2-Hexanone(MnBK)		().i ;pa	(0.1 ppm	().1 ppm	70.1 ppm	O.1 osa	:0.1 pps
Methylene Chloride		(0.1 ppm	(0.1 ppm	().1 ppm	70.1 IDE	10.1 pps	10.1 ppm
4-Methyl-2-Pentamone(MIBK)		/0.1 ppa	(0.1 ppm	(0.1 ppm	0.1 jpa	0.1 jja	0.1 pps
Styrene		-0.1 spa	(0.1 ppm	(0.1 ppa	0.1 cca	0.1 ppa	O.i pan
1,1,2.2-Tetrachloroethane	(0.1 pps		(0.1 ppm	(0.1 ppa	(0.1 pps	(0.1 ppa	0.1 ppm (0.1 ppm
Tetrachlorosthylene		:0.1 pga	(0.1 ppm	<0.1 ppa	().1 ppa	().i ppm	(0.1 pps
Toluene		40.1 ppm	(0.1 pps	().1 ppm	10.1 ppm	(0.1 pan	0.1 pgm
1,1,1-Trichlorcethane	(0.1 ppm		(0.1 ppm	(0.1 ppm	(0.1 apa	(0.1 ppm	(0.1 ppm
1,1,2-Trichlorcethane	().1 ppm		<0.1 ppm	• •	(0.1 spm		10.1 ppm
Trichloroethylene	(0.1 ppm			(0.1 ppm	Wer pha	70 t ees	/0.1 ppm
Xylenes			(0.1 nnm	(0.1 ppm		0.1 ppm	
Vinyl Acetate	(0.1 apm	(0.1 ann	(O.1 nna	(0.1 ppm		(0.1 ppm	
Vinyl Chloride	(0.1 ppm			0.49 ррш		1.44 ppm	
Total non-methane hydrocarbons							
as propane	(1.2 ppm	2.0 ppa	1.6 ppm	1.5 pps	2.1 ppm	2.5 202	7.53 sca

TABLE 4-3
SORBENT TUBE ANALYSIS

		871-3-1	971-3-2	971 - 3-3 *	371-4-1	371-4-2	371-4-3
	MOL	Results	Results	Sesults	Sesuits	Results	Sesults
VOA							
Acetone	(0.1 asm	(0.1 gpm	(0.1 ppm	(0.1 ppm	().1 pps	(0.1 ppm	(9.1 ppm
Benzene		(0.1 ppm		().1 ppm	(0.1 ppm		(0.1 ppa
Promodichloromethane		(0.1 pps		(0.1 ppm	<0.1 ppa		
9rcactors		(0.1 ppm		√0.1 ppm	(0.1 ppm		().1 ppa
Brozomethane	10.1 ppa		(0.1 ppm	(0.1 ppa	(0.1 553	(0.1 spa	1.1 553
1-Butanone (MEK)		(0.1 pga		(C.1 ppa	(0.11 ppm	0.1 ;;;	;se
Carbon Disulfide	0.1 000		40.1 ppm).1 cpa	0.1 opa	;;;:	شجب هه
Carbon Tetrachioride	10.1 ppm	(0.1 ppm	(0.1 ppm	0.1 556	(0.1 ;ga		(0.1 ppm
Chlorobenzene'	(0.1 ppm		.0.1 ppm	().1 sga	0.1 apa	0.1 251	0.1 spa
Chloroethane	(0.1 ppm	<0.1 pgm	(0.1 ;pm	(C.1 pps	().1 ppm).i opa
2-Shloroethylvinyl ether	<0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 spa		1.1 ppm
Chlorofora	<0.1 ppe		(0.1 ppm	(0.1 ppm)	0.1 pps		79.1 ppm
*Chloromethane	(0.1 ppm	(0.1 ppm	(0.1 apm	(0.1 ppm	(0.1 apm		0.1 ppm
Dibromochloromethane -	(0.1 ppm		40.1 ppa	(0.1 pps		(0.1 ppa	0.1 ppa
1,1-Dichlorcethane	(0.1 ppm	(0.1 ppm	(0.1 pps	().1 çặm		10.1 ppa	1.1 554
1.2-Dichloroethane	(0.1 ppm	<0.1 ppa	(0.1 ppm	(0.1 ppm	(0.1 ppa		(0.1 ppa
1,1-Dichlorcethene	().1 ppm	(0.1 ppm	(0.1 ppg	().1 ppm	(0.1 ppa	10.1 ppa	0.1 ppa
trans-1,2-Bichloroetheme	<0.1 ppa	(0.1 ppm	(0.1 ppm	0.1 apa	/0.1 pps		0.1 ppm
1,2-Dichloropropane	(0.1 ppm	(0.1 ppm	(0.1 ppm	40.1 apm	(0.1 pps		ી.1 βρ≊
cia-1,3-Dichloropropene	<0.1 pga	(0.1 ppm	(0.1 ppm	().1 pps	(0.1 ppa		0.1 ppm
trans-1,J-Dichloropropene	O.1 ppa	(0.1 ppm	(0.1 com	0.1 ppa	0.1 pps	0.1 ppa	3.1 :52
Ethyl Benzene	10.1 ppa	ി.1 ppa	(0.1 ppm	3.1 ppm	(0.1 ;;a	0.1 :::	3.1 538
I-Hexanone(MnBK)).1 ppm	().i pps	().1 ppm	(0.1 338	:0.1 spa		
Methylene Chloride	(0.1 ppm	(0.1 pps	(0.1 ppm	0.1 ppa /	().1 spa	(0.1 pps	0.1 ;pa
4-Methvi-2-Pentanone(MIBK)	(0.1 ppm		(0.1 ppa .		().1 pps	(0.1 pps	0.1 302
Styrene	<0.1 ppm		(0.1 ppm.	0.1 ppm	(0.1 ppm	(0.1 pps	().i ppa
1,1,2,2-Tetrachloroethane	.0.1 ppm	(0.1 ppm	(0.1 ppm	().i ppm	O.1 ppm	(0.1 ppa	0.1 :72
Tetrachloroethylene	(0.1 ppm		(0.1 ppm	().1 ppm	/0.1 ppm	(0.1 ppm	(0.1 ppm
Toluene	00.1 ppm		(0.1 ppm	(0.1 ppm	(0.1 ppm	().1 ppa	-0.1 ppm
1,1,1-Trichloroethane	<0.1 ppa		<0.1 ppm		(0.1 ppe	(0.1 ppz	40.1 ppm
1,1,2-Trichloroethane	(O.i pps		(0.1 ppm	• •	(0.1 pşa	(0.1 ppm	C.i ppa
Trichloroethylene	7).1 ppm			<pre>(0.1 ppm)</pre>	(0.1 ppm	(0.1 cpa	0.1 pps
Tylenes	(0.1 apm		<0.1 ppm			().1 ppa	().1 ppm
Vinyl Acetata	(0.1 ppm		<0.1 ppm	(0.1 ppm			0.1 ppm
Vinyl Chloride	(0.1 ppm	0.35 ppa	0.68 ppm	0.97 ppm	1.02 pps	0.32 ppm	1.30 pps
Total mon-sethane hydrocarbons				*			
as propane	< 1.2 ppa	1.7 ppm	1.6 ppa	1.9 рра	1.9 ppm	1,7 ppm	2.0 ;;;a

TABLE 4-4
SORBENT TUBE ANALYSIS

		971-5-1	371-5-2	371-5-3	371-6-1	371-6-2	371-4-3
	HDL	Results	Results	Rasults	Results	Results	Fasults
VOA						*****	*******
Acetone	(0.1 ppm	(0,1 ppm	(0.1 ppm	(0.1 ppm	().1 pgm	(0.1 ppm	(0.1 spm
Penzene		(0.1 ppm	(0.1 ppm	O.1 ppm	(0.1 ppm		0.1 ppa
Bromodichloromethane		(0.1 ppm	(0.1 ppm	10.1 ppa	0.1 ppm		70.1 ppa
8rozofora		(C.1 ppm	40.1 pgm	0.1 ppa			(0.1 pga
Broadmethane		().1 ppe	().1 ppm	().1 pga	70.1 opa	• •	O.1 ppm
I-Butanone (MEK)		(0.1 ppm	(Q.1 ppa	10.1 ppm	(0:1 ppm	:0.1 ppa	C.1 ;pa
Carbon Disulfide		(0.1 pps	10.1 ppm	0.1 ppm	(0.1 ;pm	0.1 ;::2	lvi ppa
Carbon Tetrachiorida		(0.1 ppm	(0.1 ppm	10.1 ppm	(0.1 ppm	().1 pps	ii ppa
Chlorobenzene		(0.1 ppm	(0.1 ppm	(0.1 ppa	(0.1 ppm	(0.1 553).1 ppm
Chlorcethane		(0.1 ppm	(0.1 ppm	0.1 ppm	(0.1 ppm	(0.1 cps	0.1 ;58
2-Chloroethylvinyl ather		(0.1 ppm	(0.1 ppm	(0.1 ppa	(0.1 ppm	O.1 ppa	0.1 ppm
Chlorofors		(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppm	().1 pga
Chloromethane		(0.1 ppm	(0.1 ppm	().1 ppm	(0.1 ppm	(0.1 ppm	O.i ppm
Dibromochloromethane	(0.1 cem	<0.1 ppm	(0.1 spm	(0.1 ppm	(0.1 ppm	().1 ppm	/0.1 ppm
1,1-Dichlorosthane		(0.1 ppm	(0.1 spm	(0,1 ppm	(0.1 598	0.1;;2	(6.1 ppa
1,2-Dichloroethane		(0.1 ppm	(0.1 ppm	().i ppm	(0.1 ppm	(0.1 ppm	(0.1 spm
1,1-Dichlorosthene		(0.1 ppm	(0.1 ppm	(0.1 ppm	().i ppa	40.1 ppm	0.1 ppa
trans-1,2-Bichloroethene		(0.1 ppa	(0.1 ppm	40.1 ppa	/0.1 ppa	0.1 ;;a	10.1 ppa
1,2-Dichloropropane		(0.1 spm	(0.1 ppa	(0.1 ppa	:0.1 opa	(0.1 pg2	(0.1 ppm
iis-1,3-Dichloropropene		(0.1 рра	(0.1 ppm	(0.1 ppm	(0.1 ppa	(0.1 pps	0.1 ;pa
trans-1,3-Sichlorogropene		(0.1 ppm	10.1 ppm	0.1 pps	().i ppa	(0.1 :::	1.1 050
Ethyl Benzene		(0.1 ppm	10.1 ppm	O.i cpa	O.1 pps	(0.1 352	7.1 552
2-Hexanche(Mn2K)		(0.1 ppm	10.1 ppm	0.1 :39	0.1 ppa	(0.1 222	Ni spa
Mathylene Chicrise		(6.1 ppm	10.1 ppm	5.12 ppa.	40.1 :08	12.1 pga	0.1 pps
4-Methyl-2-Pentanone(MIBK)		(0.1 ppm	(0.1 ppm	(0.1 ppa	(0.1 ppm	(0.1 spa	0.1 opa
Styrene				0.1 ppm	(0.1 ppm	(0.1 ppa	/0.1 pps
1,1,2,2-Tetrachloroethane		().1 ppm	().1 ppm	0.1 ppm		().1 ppm	:0.1 ppm
Tetrachloroethylege		(0.1 ppm	(0.1 ppm	(0.1 ppm		(0.1 ppm	79.1 ppm
Toluene		(0.1 ppm	(0.1 рра	<0.1 ppm		(0.1 apm	0.1 ppm
1,1,1-Trichloroethane	(0.1 ppm	(0.1 ppm.	<0.1 ppm			(0.1 ppa	19.1 ppa
1,1,2-Trichlorcethane	().1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppa	(0.1 ppm	(0.1 ppm
Trichloroethylene	(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppa	(0.1 ppm	(0.1 pgm	(0.1 ppm
Xylenes	(0.1 apa	<0.1 ppm	().1 ppa	40.1 opm		().1 opa	10.1 ppm
Vinyi Acetate	(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppm		(0.1 pps	(0.1 ppm
Vinyl Chloride		0.59 ppa	1.41 ppm	1.31 ppm	9.72 ppm	0.83 ppa).31 ppm
Total non-methane hydrocarbons				<i>*</i>			
as propane	< 1.2 ppm	1.5 ppm	2.1 ppm	3.3 ppa	1.7 ppm	1.7 ppm	1.9 ppm

.TABLE 4-5

SORBENT TUBE ANALYSIS

		GT2-1-1	ST2-1-2	6T2-1-3	372-3-1	672-3-2	372-3-3
, ,	HOL	Results	Results	Results	Sasults	Results	oggults
VOA	****		*******		7000000	*******	
Acetone	(0.1 pps	(0.1 ppm	(0.1 ppm	<0.1 pps	(0.1 pps	(0.1 ppm	40.1 ppa
Benzena	(0.1 pga		(0.1 ppm	(0.1 ppm	(0.1 pps	(0.1 ;pa	10.1 ppa
Bromodichloromethane		(0.1 ppm	10.1 ppm	(0.1 ppm	().1 ppm	40.1 ppm	40.1 ppm
Gromoform	<0.1 ppm		(0.1 ppm	40.1 pps	(0.1 ppm	10.1 ppm	O.1 ppm
3 <i>romomethane</i>		(0.1 ppm	(0.1 ppm	(0.1 ppm	7.1 558	().1 spm	0.1 523
I-Butanone (MEK)		(0.1 ppa	(0.1, ppa	0.1 com	(0.1 ;ta	(0.1 ;pa).1 jpr
Carton Disulfide		(0.1 ppm	(0.1 ppm	(0.1 ppm	(1.1 :52	7.1 pgs	0.1 :03
Carbon Tetrachioride		(0.1 ppm	(0.1 ppm	(0.1 ppm	(C.1 gpm	(0.1 ppa	0.1 ppm
Chiorobenzene		(0.1 ppm	(0.1 ppm	(0.1 pps	(0.1 pps	O.i spa	(0.1 spm
Chloroethane		(0.1 ppm	(0.1 ppm	().1 ppm	(0.1 ppm	(0.1 cpm	(0.1 pps
2-Chlorcethylvinyl ether		(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 san	(0.1 ppn	:0.1 ppa
Chlorofora		(0.1 ppa	(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppm
Chloromethane		(0.1 ppm	<0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppm	10.1 ;pg
Cibromochloromethane	(0.1 ppm		<0.1 ppm	(0.1 ppm		<0.1 ppm	(9.1 pgs
1,1-Dichloroethane		-<0.1 ppm	(0.1 ppm	(0.1 ppa	(0.1 ppm	().1 spm	(0.1 ;28
1,2-Dichloroethane			(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppa	(0.1 ppa
1,1-Dichlorsethene		(0.1 ppm	(0.1 ppm	(0.1 pgm	(0.1 ppm	(0.1 ppa	10.1 ppm
trans-1,2-Dichloroethene		(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppm
1,2-Dichloropropane		(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 pps	(0.1 ppm
cis-1,Z-Dichloropropene		(0.1 ppm	(0.1 ppm	40.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 pps
trans-1,3-Dichloropropene		().1 ppm	(0.1 ppm	7).1 pam	(0.1 spm	(0.1 pps	(2.1 spa
Ethyl Penzene		(0.1 ppm	(0.1 pps	(0.1 ррж	10.1 ppm	(0.1 ppa	0.1 :::
I-Hexanose(MnBK)		(0.1 ppm	(1.1 ppm	().1 ppm	O.1 spa	0.1 222	4).1 332
dethylene Chloride		(0.1 ppm	0.91 ppa	0.1 ppm	0.1 pps	O.i pra	0.1 ppm
4-Methyl-2-Pentanone(MISK)		(0.1 pps	(0.1 ppa	0.1 ppa	(0.1 ppm	(0.1 ppm	19.1 ppm
Styrene			(0.1 ppm	0.1 pps	(0.1 ppm	(0.1 ppm	Olippa
1,1,2,2-Tetrachloroethane		(0.1 cpm	(0.1 ppm	(0.1 ppa	(0.1 ppa	0.1 ppm	().1 pgs
Tetrachloroethylene		<0.1 ppa	(0.1 ppm	(0.1 ppm	(0.1 ppa	(0.1 ppm	:0.1 ppm
Toluene		(0.1 ppm	(0.1 ppa	().1 pam	(0.1 ppm	(0.1 ppm	19.1 ppa
1,1,1-Trichlorsethane			(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppm	O.1 ppa
1,1,2-Trichlorcethane		(0.1 spm	(0.1 pgm	0.1 ppm	(0.1 ppm	().i ppm	0.1 ppm
Trichloroethylene		(C.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppm	(9.1 ppm	(0.1 ppm
Xylenes		(0.1 ppm	(0.1 ppm	0.1 ppa		(0.1 pgm	(0.1 ppm
Vinyl Acetate	<0.1 ppm	(0.1 ppe	(0.1 ppm	(0.1 ppa	(0.1 ppm	(0.1 spa	10.1 ppm
Vinyl Chloride	<0.1 ppm	3.48 ppm	5.46 ppm	2.07 ppa		1.20 ppa	0.50 ppm
Total non-methane hydrocarbons							
as propane	< 1.2 ppm	3.5 ppm	5.1 ppa	2.5 ppm	1.9 ppa	2.5 ppm	1.5 ppm

TABLE 4-6

SORBENT TUBE ANALYSIS

		872-4-1	<u> </u>	372-4-3	372-5-1	372-5-2	372-5-3
	MDL	Results	Results	Results	Pesulta		Results
VBA	*****						
Acetone	(0.1 asm	(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppm	10.1 ppm
Benzene			(0.1 gpm	(0.1 ppm	0.1 pga	• •	W.1 ppm
Bromodichloromethage		(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppa		(0.1 ppm
Erazatora		(0.1 ppa	(0.1 pps	(0.1 pps	0.1 ppa	• •	0.1 ppa
Brogogethana		(0.1 ppa	(0.1 ppm	0.1 pps	0.1 323		القانوني ماه کان در ا
I-Butanona (MEK)		(0.1 ppm	(0.1 ppm	0.1 pga	74 t	0.1 22	11 134
lanten lisulfida		0.1 ppm	0.1 ppm	0.1 153	7 to		
larbon Tetracoloride	70.1 cga	(0.1 ppm	0.1 ppm	(0.1 ppm	/0.1 cca	(9.1 ;;2	in per
Chiorobeczene		(0.1 ppm	(0.1 apm	(0.1 ppm	0.1 ;;;	0.1 :58	2.1 228
IMioriethane		(0.1 pps	(0.1 ppm	C.1 ppm	0.1 :52		0.1 222
1-Chlordethylvinyl ether		(0.1 ppm	(0.1 ppm	(0.1 ppm	O.1 ;pa		בקנ וו
Chlorofora	(0.1 ppm		(0.1 ppm	(0.1 ppm	(0.1 ppa		0.1 ppa
Chloreaethane		(0.1 ppm	(0.1 ppm	(0.1 ppa	(0.1 ppg		/0.1 ppa
Dibromachloromethane	19.1 ppm	().1 ppa		(0.1 pgm	(0.1 ppa		(0.1 ppm
1,1-Sichloroethame	(0.1 ppm		(0.1 ppm		10.1 ppm		10.1 ppa
1,2-Dichiorcethans		(0.1 pgm	(0.1 pps	(0.1 ppm	(0.1 ppz		10.1 ppm
1,1-Jichlercethene	(0.1 ppm		(0.1 ppm	(0.1 ppm	(0.1 ppa	•	0.1 ppm
trans-1,2-Sichloroetheme		().i ppm	(0.1 ppm	(0.1 ppa	(0.1 ppm		19.1 ppm
1.2-Dichloropropane	(0.1 ppm		(0.1 ppm	(0.1 ppm	0.1 ppm		1 ppm
::s-1,I-Dichloropropene	(0.1 ppm		(0.1 ppa	19.1 ppa	0.1 ppm		Oli spa
trans-1,J-Dichioropropene	√0.1 apm		(0.1 ppm	(0.1 ppa	(0.1 sga	0.1 558	1.1 ;;2
Ethyl Benzene	10.1 pps		0.1 ppm	().1 ppa	0.1 ppa	0.1 pca	.1 :52
I-Hexanone(Mn8K)	- 0.1 spa		10.1 ppm	0.1 ppm	0.1 552	().1 spa	7.1 pa
dethylane Chloride	(0.1 spm	(0.1 ppm	(0.1 ppm	(0.1 pps	(0'.1 ppm		10.1 ppe
4-Methyl-2-Pentacone(MIBK)	().1 ppm	(0.1 spm	(0.1 ppa	(0.1 ppm	0.1 ppa		().1 :pa
Etyrene	(0.1 ppm	<0.1 ppm	(0.1 ppm	(C.1 ppm		(0.1 ppm	(0.1 ppa
1,1,2,2-Tetrachlorgethane	40.1 ppa	(0.1 ppm	(0.1 ppm	().1 ppm		0.1 spm	(0.1 spm
Tetrachiorcethylene	(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppm	(0.1 ppg	(0.1 ppm	(0.1 ppm
Talüene	(0.1 pam		(0.1 ppa	(0.1 ppm	40.1 ppa	(0.1 ppa	1.1 ppa
1.1,1-Trichlorosthane	70.1 ppm		(0.1 ppm	10.1 ppa	(0.1 ppm	(0.1 ppm	0.1 agg
1.1.2-Trichioroethame	10.1 ppm	().1 ppm	(0.1 ppm	(0.1 pps	(0.1 psa	40.1 ppa	0.1 ppa
Trichlorosthylene	(0.1 ggm	(0.1 ppm	(0.1 ppm	(0.1 pps	40.1 gpm	40.1 ppm	
Kylenes	(0.1 pps					(0.1 ppm	
Vinyl Acetata	<0.1 pps					(0.1 ppa	
Vinyl Chloride	(0.1 pgm	1.40 ppm).33 ppa			().1 ppa	
Total non-methane hydrocarbons					*		
ii propane	(1,7	7 f mam	1 1 554	7 7	1 6	/ 1.2 ppa	4 4
	· · · · · · · · · · · · · · · · · · ·	التولا هه -	THE Ter		Lio ppM	- 1.2 JJM	1.3 ppm

TABLE 4-7
SORBENT TUBE ANALYSIS

·		37,	-4-1	GT:	2-5-2	312	!-á-3
	MOL			Res		Res	ui ts
VOA							
Acetone	(0.1	ppa ().)		75.1	386	/A 4	. ;pa
Senzene		ppa (0.1					
Bromodichloromethane		ppa (0.)					
Greaciera		cpa (0.					
Bromomethane		35a (0.					
1-Butanone (MEK)		en O.					
Carbon Disulfida		pa ().					
Carbon Tetrachicride	(0.1						. ppa
Chlorobenzene		pa (0.2			972		-
Chloroethane		pe (0.1					
2-Chlorcethylvinyl ether		pa (0.1					
Chlorofora		pm (0.1					
Chlorosethane		pa (0.1					
Dibromoch koromethane		pa (0.1					
1,1-Dichloroethane		ipa (0.1			ppa		
1,2-Dichloroethane		pa (0.1				0.1	
1,1-Dichlorsethene		ipa (0.1					
trans-1,2-Cichloroethene		pm (0.1					
1,2-Dichloropropane		pa (0.1					
cis-1.J-Sichloropropene	(0.1 ;	DB 30.1	pps	40.1	ppB	40.1	
trags-1.3-Dichloropropene		pm (0.1					
Sthyl Senzene		gm (0.1					
I-Pexangne(MnBK)		pa <0.1					
Methylene Chloride	(0.1 p	pa <0.1	рра	<0.1	cpa	(0.1	
4-Methyl-2-Pentanone(MISK)		pm 🔾.1					
Styrene	(0.1 p	pa <0.1	ppe	<0.1	ppa	$-\mathfrak{D}.\mathfrak{1}$	ppa
1,1,2,2-Tetrachloroethane		pm <0.1					apa
Tatrachloroethylene		pm <0.1					Spa
Toluene	(0.1 p	pa <0.1	bba	<0.1	ppm	49.1	208
1,1,1-Trichloroethane		pa (0.1					
1,1,2-Trichloroethane		pm (0.1			cpa		
Trichioroethylene		pm (0.1					
Xylenes		pa (0.1					
Visyl Acetate		pa (0.1					
Vinyl Chloride	(0.1 p)	pa 0.98	spa).9 9	pps.	1.51	
Total mon-methane hydrocarbons							₹
as propane	1.2 a;	sa 1.9	226	1.8	pos	2.2	333

5.0 QUALITY ASSURANCE

5.1 QA OVERVIEW

In order to provide our clients with precise and accurate analytical results, Scott has developed and maintains a quality assurance program that meets all the requirements of the documents listed below:

- o U.S. EPA, SW-846, Test Methods for Evaluating Solid Waste, Chemical/Physical Methods, 3rd Edition, November 1986.
- o 40 Code of Federal Regulations(CFR), July 1986,
 - Part 58 Ambient Air Quality Surveillance
 - Part 60 Standards of Performance for New Stattonary Sources
 - Part 61 National Emissions Standards for Hazardous Air Pollutants
 - Part 136 Guidelines Establishing Test Procedures for the Analysis of Pollutants

Part 141 National Primary Drinking Water Regulations

- o U.S. EPA, 600/4-79-020, Methods for Chemical Analysis of Water and Wastes, March 1983.
- o Standard Methods for the Examination of Water and Wastewater, 14th edition, 1975.
- o U.S. EPA Contract Laboratory Program, Statement of Work for Organic Analysis, July 1987.

All samples received by Scott are handled in the brief outline described below to assure that proper identification, storage, analysis, and reporting is accurate.

- -Chain of custody forms are generated, samples are logged in, type of testing is assigned.
- -Samples are preserved and/or stored properly.
- -Samples are signed in/out and dated by the analyst.
- -Instruments are calibrated and/or standardized.

- -Raw data of the analysis is reviewed by the operator to determine if corrective action is necessary.
- -All raw data, calculations, and quality control data are compiled and submitted to lab manager/supervisor/project manager.
- -A report is generated, typed, and proofread.
- -The draft is reviewed by the project manager, the lab manager/ supervisor, and by the quality assurance manager.
- -The final report is corrected, copied, and then issued.

5.2 SAMPLE CUSTODY

All samples submitted to the laboratory must be accompanied by a chain of custody/analysis request form. If one does not accompany the samples, one will be assigned at the time of receipt. All samples will be inspected to determine if there was any damage during transportation that may prevent or bias the analysis of the samples. Each of the samples will be logged in by lab personnel and assigned a lab number. Prior to removal or replacement of the samples from the storage area, the analyst must sign and date the chain of custody form. The original chain of custody sheets remain in the custody of Scott, unless otherwise specified.

5.3 BLANKS AND DUPLICATES

Field blanks and laboratory blanks are analyzed to insure that no contamination occurred during conditioning, sampling, storage, and analysis of the sorbent traps. If it has been determined that a contamination exists in the sample and that the results of the analysis of the samples are biased, the analysis is halted and corrective action is taken. Blanks accompanying a set of samples exhibiting concentrations of the organic compounds of interest will be used to correct the results of the samples.

Duplicate analysis is performed to determine the precision of the techniques and equipment utilized. Since the samples are collected on sorbent traps to be completely analyzed, duplicate injections of the samples cannot be done. Duplicate samples must be collected in the field using identical sampling conditions. Collecting these duplicate samples will indicate the precision of the sampling equipment and rechniques.

A single calibration check standard was used to determine if the instrument is drifting. If the drift exceeded 15% from day to day, corrective action was taken.

Quantitation of the samples was done utilizing the internal standard technique. Internal standards were flash-injected on to each of the samples.

Calibration of the GC/MS was done every 12 hours of GC/MS operation using FC-43 (perfluorotributylamine) and BFB (bromofluorobenzene). Scott has met the ion abundance criteria for BFB only as stated in Method 8240 of U.S. SPA SW-846, (see Table 5-1).

5.4 IDENTIFICATION AND QUANTITATION

Identification of the compounds of interest were done by determining the retention times of the compounds using the external standard technique and by scanning the primary ion at that particular retention time. Identification of unknown compounds, that may become target compounds, will be determined by comparing the total spectra of the unknown to spectra in the NBS library.

TABLE 5-1
BFB KEY ION ABUNDANCE CRITERIA

Mass	Ion Abundance Criteria
50	15 to 40% of mass 95
75	30 to 60% of mass 95
95	base peak, 100% relative abundance
96	5 to 9% of mass 95
173	less than 2% of mass 174
174	greater than 50% of mass 95
175	5 to 9% of mass 174
176	greater than 95% but less than 101% of mass 174
177	5 to 9% of mass 176

APPENDIX A

CHAIN OF CUSTODY FORM

- BNIN

rs.

Figure 9-18.

TABLE 3-1
LANDFILL GAS ANALYTICAL DATA

COMBE FILL SOUTH LANDFILL MORRIS COUNTY, NEW JERSEY

Sample ID	% CH4	<u>% 02</u>	% N2	% CO2	% CO	ppm H2S	ppm TVC1	HHV
GT 1-1	66.7	2.0	8.0	20.0	<1.0	14.9	41.37	689
GT 1-2	68.7	2.0	8.0	21.3	<1.0	15.9	44.76	687
GT 1-3	48.7	3.4	27.2	21.2	<1.0	2.31	18.22	484
GT 1-4	50.0	3.2	28.9	177.9	<1.0	3.26	36.60	500
GT 1-5	46.8	4.9	34.0	14.3	<1.0	1.74	21.12	468
GT 1-6	<u>45.0</u>	<u>4.6</u>	<u>32.5</u>	17.9	<1.0	2,50	<u>18.99</u>	<u>450</u>
AVERAGE	54.3	3.4	23.1	18.8	< 1.0	6.77	30.19	546
CT 2.1	46.7	6.9	39.2	7.2	<1.0	ND	27.52	467
GT 2-1 FT 2-3	40.1	6.9	43.4	9.6	<1.0	- ND	19.05	401
JT 2-4	40.1	6.9	43.4	9.6	<1.0	ND	18.02	401
GT 2-5	38.3	9.2	49.4	3.1	<1.0	ND	16.98	383
GT 2-6	38.3	9.2	49.4	3.1	<1.0	ND	21.1	383
AVERAGE	40.7	7.8	45.0	6.5	<1.0	ND	20.53	407
OVERALL AVERAGE	47.5	5.6	34.0	12.6	<1.0	3.4	25.36	477

Notes:

^{1.} TVC1 is total volatile chlorinated organics, ppmv, expressed as methylene chloride.

^{2.} HHV (higher heating value) of the gas is based on methane content, BTU/scf.

^{3.} PPM H2S is a total mercaptans and hydrogen sulfide, expressed as PPM H2S.

^{4.} ND indicates Not Detected.

^{5.} Average gas temperature = 70 degrees Fahrenheit.

^{6.} Samples collected 2/15/89 to 2/16/89

WITH TANKS BARRELS AND LOOSE LEACHATE --DISCHARGES TO STREAM-TRUCK L DUMPSTER-PROUT BROOK A DISCOUNT BELOW THIS POINT ... SEEPS DISCHARGE NOTES: I GAS TEST WELLS LOCATIONS TO BE

FIGURE 5

LEGEND

GOMBE FILL BOUTH LANDFILL PROPERTY BOUNDARY

LEACHATE SEEP

AREA WITH STRONG ORGANIC YAPOR

SWAMP AREA

STANDING WATER

AREA OCCUPIED BY

NUMEROUS SEEPS

GAS TEST WELL

COMBE FILL SOUTH LANDFILL REMEDIAL DESIGN

SEPTEMBER 1988

GAS TEST WELL LOCATIONS

- VERIFIED IN FIELD,
- 2. SITE MAP BASED ON MAP DEVELOPED BY LAWLERS, MATUSKY SKELLY ENGINEERS.

Scale in feet.

OBRIENG GERE

II. Condensate Sampling Report



Memorandum

Kevin Farmer To:

9/13/89 Date:

From:

- F-5g

RMR R.M. Rybinski

3013.012.322 File:

Subject: Combe South Landfill - Condensate Collection

Copies: JJKeegan **RDJones** SWAnagnost **AJCaracciolo**

John Knox

On September 6, 1989 at 10:10 a.m. John Knox of the O'Brien & Gere Edison Office and this writer arrived at the Combe Fill South landfill near Chester, New Jersey to collect condensate from the gas extraction well 5.5

Well GT-1 was chosen because it is the deeper (41) and has a higher tast temperature than Well GT-2. Therefore, condensate production should be greater for Well GT-1. The 1 hp regenerative exhauster and piping which was used in February 1989 for gas sampling was utilized. A condenser was constructed of '" I.D. soft copper tubing coiled in a cooler packed with ice. A trap with a valve was used to drain off the condensate

Initially the exhauster was adjusted to draw approximately 5 CFM of gas to minimize the well shortcircuiting to the atmosphere and lowering the relative humidity of the gas. The landfill gas was 76°F, the methane gas concentration was 62%, the HnU meter was 3 ppm in the well and zero in the atmosphere. Condensate production was a maximum of approximately one-half to 2/3 cup of condensate per hour. A total of 14 pints of condensate was collected in approximately four hours. We left the site at 3:45. The pump was left running for approximately four additional hours intil

On September 7, 1989 at 7:20 a.m. we returned to the site. approximately 4 cup of condensate collected overnight. The exhauster's pumping rate was increased to approximately 17.5 CFM to increase the condensate production. Initially the methane concentration was 62%, the gas temperature was 76°F, HnU was zero in the atmosphere. Conductivity of the condensate was 35 micro-ohms. During the day the percent methane value gradually decreased from 62% to 47% by 2:30 p.m. This indicates that the well may have been short-circuiting to the atmosphere. Approximately 2 pints of condensate were collected at approximately the same rate of 's cup per hour. We stopped collecting condensate at 3:00 p.m. & dis-assembled all the equipment and left the site at 3:45 p.m. John Knox sent the samples to York Laboratories in Monroe, Connecticut. sample containers sent were: (2) 40 ml vials for SW846 Method 824D (Volatile Organics, (1) pint for COD, TOC & Phosphorus, (1) pint for TkN, NH3N & NO3Bm (1) pint for BOD5, and approx. (1) cup in a quart container for phenolics. The total amount of condensate collected was approximately 34 pints. The goal was to collect (6) quarts of condensate:

September 26, 1989

30890-1587 O'BRIEN & GERE Raritan Plaza 1 Edison, New Jersey 08837

Re: Combe Landfill South

Attention: Mr. Kevin Farmer

PURPOSE

One sample was submitted to York Laboratories Division of YWC, Inc. by O'Brien & Gere. The client requested the sample be analyzed for TCL volatile organics, ammonia-nitrogen, biochemical oxygen demand (5 day), chemical oxygen demand, nitrate-nitrogen, phenols, phosphorus, total kjeldahl nitrogen and total organic carbon.

METHODOLOGY

Volatile organics were determined using purge and trap GC/MS. The instrumentation used was a Tekmar Dynamic Headspace Concentrator interfaced with a Hewlett-Packard Model 5995C GC/MS/DS.

Phenols were determined colorimetrically after preliminary distillation.

All other analyses were conducted according to <u>Standard Methods for the Examination of Water and Wastewater</u>, 16th Edition, 1985, APHA-AWWA-WPCF; and <u>Methods for Chemical Analysis of Water and Wastes</u>, USEPA 600/4-79-020.

Volatile organics were determined according to USEPA Contract Laboratory Program Protocols, Organics Analysis IFB WA 87K236/37/38.

RESULTS

The results are presented in the following Tables. Also enclosed as Appendix A is the data package containing all relevant QA/QC and raw data.

Prepared by:

Jeffrey C.\Curran Laboratory Manager

JCC/md

The liability of YWC, Inc. is limited to the actual dollar value of this project.

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TABLE 1.0 30890-1587 O'BRIEN & GERE

Aqueous

EPA TCL VOLATILE COMPOUNDS

All values are ug/L.

Sample Identification

Dilution Factor	1.0	1.0	
Method Blank I.D.	>G0964	<u>>G0964</u>	
<u>Compound</u>	Method <u>Blank</u>	<u>GT-1</u>	Method Detection Limits with no Dilution
Chloromethane	U	U	10
Bromomethane	Ŭ	U	10
Vinyl Chloride	U	U	10
Chloroethane	U	U .	10
Methylene Chloride	2J	U	5 ,
Acetone	13	108	10
Carbon Disulfide	U	U	5
1,1-Dichloroethene	U	U	5
,1-Dichloroethane	Ų	· U	5
2-Dichloroethene (total)	Ü	- U	5 ;
chloroform	. U	U	5
1,2-Dichloroethane	· U	Ü	5
2-Butanone	U	U	10
1,1,1-Trichloroethane	, U	Ŭ	5
Carbon Tetrachloride	Ų	Ų	5
Vinyl Acetate	U	U	10
Bromodichloromethane	U	U	. 5
1,2-Dichloropropane	Ü	Ų	. 5
cis-1,3-Dichloropropene	U	Ŭ	5
Trichloroethene	Ų	Ü	5
Dibromochloromethane	U	Ü	5
1,1,2-Trichloroethane	U H	Ų	5
Benzene	U .	U	5
trans-1,3-Dichloropropene Bromoform		U	, .
4-Methyl-2-pentanone		Ŭ U	10
2-Hexanone		U	10
Tetrachloroethene	ü	Ü	10
1,1,2,2-Tetrachloroethane	ŭ	U	3 E
Toluene	U 11	21	3 E
Chlorobenzene	U 11	21 3J	· 3
Ethylbenzene			3 E
Styrene	U	16) E
Xylene (total)	U U	U	. <u>5</u>
Affelie (LULAI)	U	33	5

., J, B - See Appendix for definition.

Note: Sample detection limit = MDL x dilution factor.

35 -

TABLE 2.0 30890-1587 O'BRIEN & GERE INORGANICS

All values are mg/L.

<u>Parameter</u>	
Ammonia-Nitrogen	23.8
Biochemical Oxygen Demand (5 day)	12
Chemical Oxygen Demand	98.8
Nitrate-Nitrogen	<0.10
Phenols _	0.092
Phosphorus, total	<0.15
Total Kjeldahl Nitrogen	24.2
Total Organic Carbon	24.8

APPENDIX

- U Indicates that the compound was analyzed for but not detected.
- J Indicates that the compound was analyzed for and determined to be present in the sample. The mass spectrum of the compound meets the identification criteria of the method. The concentration listed is an estimated value, which is less than the specified minimum detection limit but is greater than zero.
- B This flag is used when the analyte is found in the blanks as well as the sample. It indicates possible sample contamination and warns the datauser to use caution when applying the results of this analyte.
- N Indicates that the compound was analyzed for but not requested as an analyte. Value will not be listed on tabular result sheet.
- X Matrix spike compound.
- (1) Cannot be separated from diphenylamine.
- (2) Decomposes to azobenzene. Measured and calibrated as azobenzene.
- A This flag indicates that a TIC is a suspected aldol condensation product.
- E Indicates that it exceeds calibration curve range.
- D This flag identifies all compounds identified in an analysis at a secondary dilution factor.

III. Test Pit Investigation

MEMO TO THE FILES

FROM: A.J. Caracciolo/J.R. Knox

RE:

Combe Fill South Landfill

Remedial Design

Fill Delineation - Test Pit Investigation

DATE:

March 16, 1989

FILE:

3013.012 #3

CC:

J.J. Keegan S.J. Roland R.P. Cawley G.A. Swenson S.W. Anagnost

As part of the Fill Delineation activities for the above referenced project, test pits were installed to locate the edge of fill. The program was conducted in accordance with the Field Sampling and Testing Plan (November 1988). Based on a review of the geophysical survey work and the aerial photograph epic, test pit locations were proposed (Memo to the Files, from G.A. Swenson, November 17, 1989). Additional test pits, on the north, west and south border, were installed at the request of the NJDEP to verify the location of the fill in those areas. Exact locations of the test pits were field determined by J.R. Knox, the O'Brien & Gere on-site geologist. The locations of the test pits were approved in the field, by the NJDEP representative. Field work was conducted on December 13, 14, 20 and 21, 1988. M. Madsen, on-site inspector for the NJDEP was present for the installations. Additionally, G. Giles, the site geologist for the NJDEP, was present on December 21, 1988. The test pits were installed by Schall Construction utilizing a rubber tire backhoe.

A total of twenty-nine (29) test pits were constructed; located as shown on the attached Figure 1. The purpose of the test pit installation was to locate the edge of the fill material, and as such, a trenching operation was utilized, resulting in pits ranging in size from 45 to 60 feet long with an average depth of 6 feet. A typical cross-section of the test pits is provided as Figure 2. Test Pit Logs were completed for each test pit location and are attached to this Memo. Following excavation, the test pits were photographed and promptly backfilled. The edge of fill, at each pit location, was staked and then located using field instrument survey techniques.

The edge of fill locations were plotted on the attached site map (Figure 1). This information was coupled with the results of the geophysical survey, the aerial photo review and a review of site topography (natural contours and bedrock outcroppings) to develop the edge of fill map (Figure 1). Based on the available information described above, this map represents the extent of the main fill area of the Combe Fill South Landfill.

While conducting Test Pit 14, 55-gallon drums were encountered at a depth of five to seven feet. The drums contained some liquid material, which from the odor was potentially identified as a pesticide product. No labels or names were noted on the drums. The excavation was promptly backfilled. A seam of Mennen Baby Lotion and Baby Care Soap bottles was located at Test Pit 18. The seam extended from just below the ground surface to a depth of three to four feet. Product was found in the some of the containers. This excavation was also promptly backfilled. The NJDEP should be advised to determine if emergency removal of these drums is warranted.

JOB : 3013.012.123

OBG FIELD S WEATHER:	CLOUDY COLD		EST PIT #: .	1 12/13/88	
DEPTH	DESCRI	PTION			
1 —	BROWN SILTY M-C SAND				
2 -	RED BROWN F-M SANDY SILT			·	
4 -	BIEGE/TAN GRANITIC SAPPROLITE	·			
— 5 — — 6 —	•	•			
— 7 — — 8 —	•				
9 10	GRANITIC SAPPROLITE		·	•	•
<u> </u>					
NOTES: 1		LENGTH 6'	X DEPTH 8'		
TEST PIT PLOT PLAN	SEE ATTACHED FIGURE #1		O'Brien & Gere		

SITE: COMBE FILL SOUTH

JOB #: 3013.012.123

	SUPERMSOR: J. KNOX CLOUDY, COLD	TEST PIT #: DATE:12/13/88
DEPTH	DESCRI	PTION
0	MIXTURE OF TOPSOIL & GRANITE CO	BBLES
2 -	TRASH	
4	GRANITIC SAPPROLITE	
- 5 - - 6 -		
— 7 — — 8 —		· · · · · · · · · · · · · · · · · · ·
9 10		·
NOTES: 1.	SEE PHOTO LOG 3. L SEE TYPICAL CROSS-SECTION	ENGTH 12' X DEPTH 9'
TEST PIT PLOT PLAN	SEE ATTACHED FIGURE #1	O'BRIEN & GERE O'Brien & Gere Engineers, Inc.

SITE: COMBE FILL SOUTH

JOB : 3013.012.123

	UPERMSOR: J. KNOX CLOUDY, COLD	TEST PIT #:3 DATE:12/13/88
DEPTH	DESCRI	PTION
0	ORANGE BROWN SILTY SAND SOME	
	GRANITE COBBLES	
_ 3 _	TRASH ENCOUNTERED AT NORTH END	OF PIT
4 —	ORANGE BROWN SILTY SAND	•
- 5 - - 6 -		
— 7 — — 8 —	·	
—10 — —11 —	GRANITIC SAPPROLITE	
NOTES: 1.	SEE PHOTO LOG 3. SEE TYPICAL CROSS-SECTION	21' LENGTH X 9' DEPTH
TEST PIT PLOT PLAN	SEE ATTACHED FIGURE #1	O'Brien & Gere Engineers, Inc.

JOB #: 3013.012.123

	CLOUDY, COLD	TEST PIT #:4 DATE:12/13/88
DEPTH	DESCRI	PTION
1 -	TRASH AT EDGE OF ROAD INTERMINATION OF THE STAND	KED
3 4	ORANGE BROWN, SILTY CLAYEY M-C SAND	
5 —		
8		
—10 — —11 —	BLACK ORGANIC LAYER GRANITIC SAPPROLITE	
NOTES: 1.		LENGTH 39' X DEPTH 12'
TEST PIT PLOT PLAN	SEE ATTACHED FIGURE #1	O'Brien & Gere Engineers, Inc.

JOB : 3013.012.123

08G FIELD SI WEATHER:	JPERMSOR: J. KNOX CLOUDY, COLD		TEST PIT #: .	5
DEPTH	DESCRI	PTION		
	ORANGE-BROWN SILTY F-M SAND (f	ill mtl.)		•
3	BLACK BROWN TOPSOIL			
- 5 6 7 8 8	BROWN GRAY ORANGE SILTY CLAYEY F-M SAND	•		
9 — —10 — —11 —		·		-
NOTES: 1.	SEE PHOTO LOG 3. SEE TYPICAL CROSS-SECTION	LENGTH 9	' X DE PTH 12'	
TEST PIT PLOT PLAN	SEE ATTACHED FIGURE #1		OBRIEN OBRIEN	

SITE: COMBE FILL SOUTH LANDFILL

JOB #: 3013.012.123

OBG FIELD SUPERVISOR	JOHN KNOX	TEST PIT	6-7-8
WEATHER: CLOUDY.	COLD	DATE:	12-13-88

DEPTH	DESCRIPTION
0 -	-HIT TRASH @ DEPTHS OF 2' & 6'
2 3	BAD ODOR, HIT H ₂ O IN ALL THREE @ 2' - OIL LAYER PRESENT
4	-HIT ABANDONED PIPE IN SOUTH CORNER OF #8
6 -	N N
8 -	I TP#/6
-10 -11	17948 Lune Kgate
NOTES:	SEE TYPICAL CROSS-SECTION

TEST PIT
PLOT PLAN SEE ATTACHED
FIGURE #1



SITE: COMBE FILL SOUTH LANDFILL

JOB : 3013.012.123

08G FIELD :	SUPERMSOR:	JOHN KNOX	TEST PIT	9
WEATHER:	CLOUDY,	COLD	DATE: _	12/13/88

DEPTH	DESCRIPTION
- 0 1 2 3 3	0-3½ - ORANGE BROWN F-C SILTY SAND, SOME GRANITE COBBLES
4 —	3½-7'- SAPPROLITE (GRANITE)
5 —	
7 —	
8	
10	
NOTES: 1. SI	EE PHOTO LOG 3. LENGTH 9' X DEPTH 7'

2. SEE TYPICAL CROSS-SECTION

TEST PIT
PLOT PLAN SEE ATTACHED
FIGURE #1



SITE: COMBE FILL SOUTH

JOB #: 3013.012.123

	CLOUDY COLD	TEST PIT #:
DEPTH	DESCRIF	PTION
h 0 -+	NORTH	
	TRASH & FILL CLAY	LTY SAND
	STRONG SEWAGE ODER DARK BROWN ORGANI	SILTY SAND ICS
2	GRANITIC SAPPROLITE	
— 3 —	\	
- 4 -		
5		•
6 —		
7 —	<u>.</u>	
8	·	
9 —		
10		•
11 —		
NOTES:	1. SEE PHOTO LOG 2. SEE TYPICAL CROSS-SECTION	3. LENGTH 20' X DEPTH 5'
TEST PIT PLOT PLAN	SEE ATTACHED FIGURE #1	OBRIENS GERE O'Brien & Gere Engineers, Inc.

JOB : 3013.012.123

OBG FIELD SUPE	RMSOR:	JOHN KNOX	TEST PIT #	1.3
WEATHER:	CLOUDY,	COLD	DATE:	12/13/88

DEPTH	DESCRIPTION
1 -	ORANGE BROWN, SILTY CLAYEY F-M SAND SOME GRANITE COBBLES
	TRASH @ NORTHERN END
4 —	GRANITIC SAPPROLITE
- 5 - - 6 -	
— 7 — — 8 —	
9 —	
_11 _	
l .	1. SEE PHOTO LOG 3. LENGTH 25' X DEPTH 8' 2. SEE TYPICAL CROSS-SECTION

TEST PIT PLOT PLAN

SEE ATTACHED FIGURE #1



SITE: COMBE FILL SOUTH

JOB : 3013.012.123

OBG FIELD	SUPERMSOR:	JOHN KNOX	TEST PI	T #: 14
WEATHER:	CLOUDY &	COLD .	_ DATE:	12/14/88

DEPTH	DESCRIPTION
- 0 - - 1 - - 2 -	ORANGE-BROWN SILTY F-M SAND SOME GRANITE RUBBLE TR. ORGANIC MTL. & CLAY
- 3 - - 4 - - 5 -	DARK GRAY SILTY F-C SAND TR. CLAY INTERMIXED WITH TRASH (BURIED DRUMS @ 5'-SMELLS LIKE PESTICIDES 50 PPM ON HNU)
- 6 - - 7 - - 8 - - 9 - -10 -	GRANITIC SAPPROLITE
11	1. SEE PHOTO LOG 3. LENGTH 90±' X DEPTH 6' 2. SEE TYPICAL CROSS-SECTION

TEST PIT PLOT PLAN

SEE ATTACHED FIGURE #1



SITE: COMBE FILL SOUTH

JOB #: 3013.012.123

	PT CLOUDY & COLD	TI	est pit f : ate:	15	
DEPTH	DESCR	PTION			
- 0 - - 1 -	BROWN, SILTY F-M SAND SOM MATERIAL	E ORGANIC			
	TRASH ON NORTHERN END OF	PIT	-		
4 —	GRANITIC SAPPROLITE				
5 —		.•		*	
6 —					
7 -					•
8 -			۰		
9					
—10 — —11 —					
NOTES:	1. SEE PHOTO LOG 2. SEE TYPICAL CROSS-SEC		ENGTH 9' X	DEPTH 6'	
TEST PIT PLOT PLAN	SEE ATTACHED FIGURE #1			시된 GERE e Engineers, Inc.	

SITE: COMBE FILL SOUTH

JOB : 3013.012.123

OBG FIELD S	SUPERMSOR:	JOHN KNOX	TEST PIT	16
WEATHER:	PT CLOUI	OY & COLD	. DATE: _	12/14/88

DEPTH	DESCRIPTION
- 0 - - 1 - - 2 -	ORANGE-BROWN, SILTY F-M SAND TR. GRANITE COBBLES
- 3-	-@ SOUTHERN END HIT PERFORATED PIPES @ 3' GRAY-BROWN SANDY SILT TR. CLAY
5 —	-HIT TRASH AT NORTHERN END OF PIT @ 6' DEPTH .
- 5 - - 7 -	GRANITIC SAPPROLITE
9 —	
—11 —	
NOTES:	1. SEE PHOTO LOG 3. LENGTH 35' X 6' DEEP 2. SEE TYPICAL CROSS-SECTION

TEST PIT
PLOT PLAN SEE ATTACHED
FIGURE #1



SITE: COMBE FILL SOUTH

JOB #: 3013.012.123

	UPERMSOR: JOHN KNOX SUNNY, COLD	-	TEST PIT #:	17
DEPTH	DESCRI	PTION		
- 0 - - 1 - - 2 -	ORANGE-BROWN, SILTY F-C SAND SOME GRANITE BOULDERS TR. CLA	ΑΥ		
- 3	DARK GRAY, F-M SAND SOME GANITE BOULDERS TR. SILT WITH TRASH INTERMIXED			
-10 - -11 -	GRANITIC SAPPROLITE			
NOTES:	1. SEE PHOTO LOG 2. SEE TYPICAL CROSS-SECTION	3. LENG	тн 50' х рертн	10'
TEST PIT PLOT PLAN	SEE ATTACHED FIGURE #1		OBRIEN O'Brien & Gere	I & GERE Engineers, Inc.

JOB : 3013.012.123

OBG FIELD SUP WEATHER:	ERMSOR: JOHN KNOX SUNNY COLD	TEST PIT #:	18 12/15/88
DEPTH	DESCRI	PTION	
0 1	MENNEN BABY MAGIC LOTION BOTTLES INTERMIXED WITH FI	LL MATERIAL	
3		· ·	
5		•	
7 -	GRANITIC SAPPROLITE		
9	,		
NOTES:	1. SEE PHOTO LOG 2. SEE TYPICAL CROSS-SECT	3. LENGTH 45' X	DEPTH 6'
TEST PIT PLOT PLAN	SEE ATTACHED FIGURE #1		15 GERE e Engineers, Inc.

SITE: COMBE FILL SOUTH

JOB #: 3013.012.123

	PERMSOR: JOHN KNOX	TEST PIT #:	19 12/15/88
MEAINER:	SUNNY COLD		
DEPTH	DESCRI	PTION	
0	ORANGE-BROWN, SILTY F-C SA	AND	
3 -	DARK GRAY, CLAYEY SILTY F- SOME GRANITE COBBLES	-M SAND	
5 —	TRASH (BURNT)		·
_ 7 _ _ 8 _	GRANITIC SAPPROLITE		
9 — —10 — —11 —			
NOTES:	1. SEE PHOTO LOG 2. SEE TYPICAL CROSS-SEC	3. LENGTH 60' X	DEPTH 6'
TEST PIT PLOT PLAN	SEE ATTACHED FIGURE #1		N & GERE tre Engineers, Inc.

SITE: CONBE FILL SOUTH

JOB : 3013.012.123

	ERVISOR: JOHN KNOX SUNNY, COLD	TEST PIT #:
DEPTH	DESCRIP	TION
1 - 2 -	DARK GRAY, SILTY CLAYEY F-M	SAND
3 —		· ·
- 5 - - 6 - - 7 -		
8 9	REFUSE	
10	GRANITIC SAPPROLITE	
NOTES:	1. SEE PHOTO LOG 2. SEE TYPICAL CROSS-SECTI	3. LENGTH 20' X DEPTH 10'
TEST PIT PLOT PLAN	SEE ATTACHED FIGURE #1	O'BRIEN & GERE O'Brien & Gere Engineers, Inc.

SITE: COMBE FILL SOUTH

JOB : 3013.012.123

DEPTH	DESCRIPTION
- 0 -	ORANGE-BROWN SILTY F-C SAND, SOME GRANITE COBBLES
	TRASH INTERMIXED WITH ABOVE
-3	GRANITIC SAPPROLITE
- 4 -	
- 5 -	
- 6 -	
-7	•
—10 —	
-11 -	

TEST PIT
PLOT PLAN SEE ATTACHED
FIGURE #1



JOB #: 3013.012.123

OBG FIELD SUPERM	SOR: JOHN KNOX		22
WEATHER:COLD	SUNNY	DATE:	12/15/88

DEPTH	DESCRIPTION
0 -	BROWN, SILTY F-C SAND, SOME
2	GRANITE RUBBLE, TR. DECAYING
4 -	
5 - 6 -	
7 —	
9 —	GRANITIC SAPPROLITE
10 — 11 —	
NOTES:	1. SEE PHOTO LOG 3. LENGTH 10' X DEPTH 8' 2. SEE TYPICAL CROSS-SECTION

TEST PIT PLOT PLAN

SEE ATTACHED FIGURE #1



SITE: COMBE FILL SOUTH

JOB #: 3013.012.123

OBG FIELD	SUPERMSOR:	JOHN KNOX	Ti	EST PIT	23
WEATHER:	SUNN		0/	ATE: _	12/20/88

DEPTH	DESCRIPTION
- 0	O' - 15'- BROWN, SILTY F-C SAND WITH SOME GRANITE RUBBLE DECAYING ORGANIC MATERIAL (STRONG PESTICIDE ODOR)
— 5 — — 6 — — 7 —	
9 — —10 — —11 —	
NOTES:	1. SEE PHOTO LOG 3. LENGTH 9' X DEPTH 15' 2. SEE TYPICAL CROSS-SECTION

TEST PIT PLOT PLAN

SEE ATTACHED FIGURE #1



SITE: COMBE FILL SOUTH JOB #: 3013.012.123

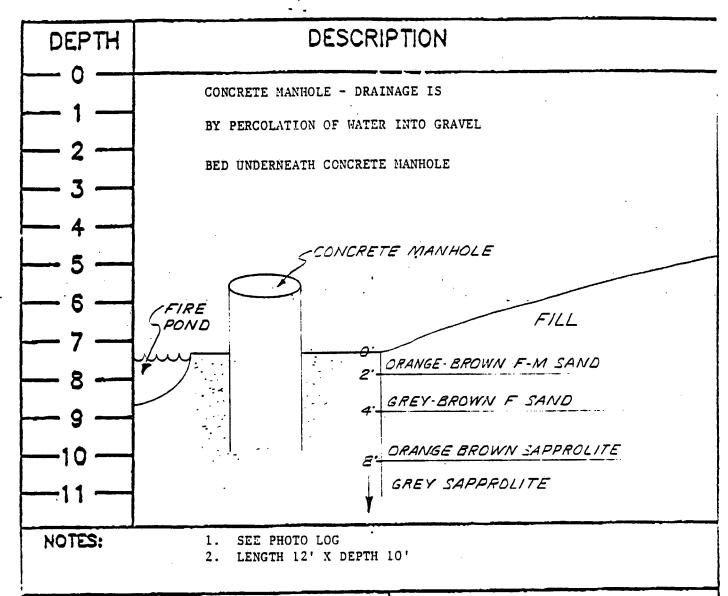
OBG FIELD SUPERMSOR:	JOHN KNOX	TEST PIT #:	24
_ - · ·	Y, COLD	DATE:	12/20/88

	• •
DEPTH	DESCRIPTION
_ 1	BROWN, SILTY F-M SAND SOME GRANITE COBBLES
	GRAY SILTY F-M SAND SOME GRANITE COBBLES INTERMIXED WITH REFUSE
_ 3 _	GRANITE SAPPROLITE
 5 	
— 6 — — 7 —	
8	
— 9 — —10 —	
—11—	
NOTES:	1. SEE PHOTO LOG 3. LENGTH 100' X DEPTH 4' 2. SEE TYPICAL CROSS-SECTION
TEST PIT PLOT PLAN	SEE ATTACHED SEE ATTACHED O'Brien & Gere Engineers, Inc.



JOB #: 3013.012.123

OBG FIELD S	SUPERMSOR:	JOHN KNOX	_ TEST PI	T #:25
WEATHER:	RAIN	COLD	_ DATE:	12/21/88



TEST PIT PLOT PLAN

SEE ATTACHED FIGURE #1



JOB : 3013.012.123

OBG FIELD SUPERVISOR: JOHN KNOX TEST PIT #: 26
WEATHER: RAINY, GOLD DATE: 12/21/88

DEPTH	DESCRIPTION
	GRAY ORANGE BROWN, SILTY F-C SAND SOME COBBLES
2 —	TRASH INTERMIXED WITH ABOVE
3	GRANITIC SAPPROLITE
5 —	GRANTIE GALLROLLE
6 -	
8	
9 —	
11 -	
NOTES:	1. SEE PHOTO LOG 3. LENGTH 45' X DEPTH 3' 2. SEE TYPICAL CROSS-SECTION

TEST PIT PLOT PLAN

SEE ATTACHED FIGURE #1



JOB : 3013.012.123

OBG FIELD SUPERMSOR: JOHN KNOX TEST PIT #: 27
WEATHER: RAINY COLD DATE: 12/21/88

DEPTH	DESCRIPTION
0 -	COVER MATERIAL: GRAY, ORANGE-BROWN, SILTY F-C SAND SOME LG. GRANITE COBBLES
_ 2 _	SAME AS ABOVE WITH REFUSE MIXED IN
_ 3 —	
4 -	GRANITIC SAPPROLITE
5 -	
7-	
8	
9 —	
11 —	
NOTES:	1. SEE PHOTO LOG 3. LENGTH 15' X DEPTH 3' 2. SEE TYPICAL CROSS-SECTION

TEST PIT PLOT PLAN

SEE ATTACHED FIGURE #1



JOB : 3013.012.123

OBG FIELD S	SUPERMSOR:	JOHN KNOX	TEST PIT #:	28
WEATHER:	RAINY, COLD		DATE:	12/21/88

DEPTH	DESCRIPTION
0 -	COVER MATERIAL: GRAY ORANGE BROWN, SILTY F-C SAND SOME LG. GRANITE COBBLES
_ 2	SAME AS ABOVE WITH REFUSE MIXED IN
3	
- 4	GRANITIC SAPPROLITE
 5	
_ 6 _	
— 7 — — 8 —	
g	
-10	
11	
	1. SEE PHOTO LOG 3. LENGTH 30' X DEPTH 3' 2. SEE TYPICAL CROSS-SECTION
	2. OLL LITTORE OROUS-SECTION
TEST PIT	

OBRIEN & GERE
O'Brien & Gere Engineers, Inc.

SEE ATTACHED FIGURE #1

PLOT PLAN

SITE: COMBE FILL SOUTH LANDFILL

JOB #: 3013.012.123

OBG FIELD	SUPERMSOR:	JOHN KNOX	TEST PIT	1: = 29
WEATHER:	RAINY	- COLD	DATE:	12/21/88

DEPTH	DESCRIPTION
0	COVER MATERIAL: GRAY ORANGE BROWN SILTY F-C SAND SOME LG. GRANITE COBBLES
_ 2	SAME AS ABOVE WITH REFUSE MIXED IN
3	
- 4	GRANITIC SAPPROLITE
5 6	
- 7 - 	
— 8 — — 9 —	
_10 _	
11	
NOTES:	1. SEE PHOTO LOG 3. LENGTH 45' X DEPTH 3' 2. SEE TYPICAL CROSS-SECTION

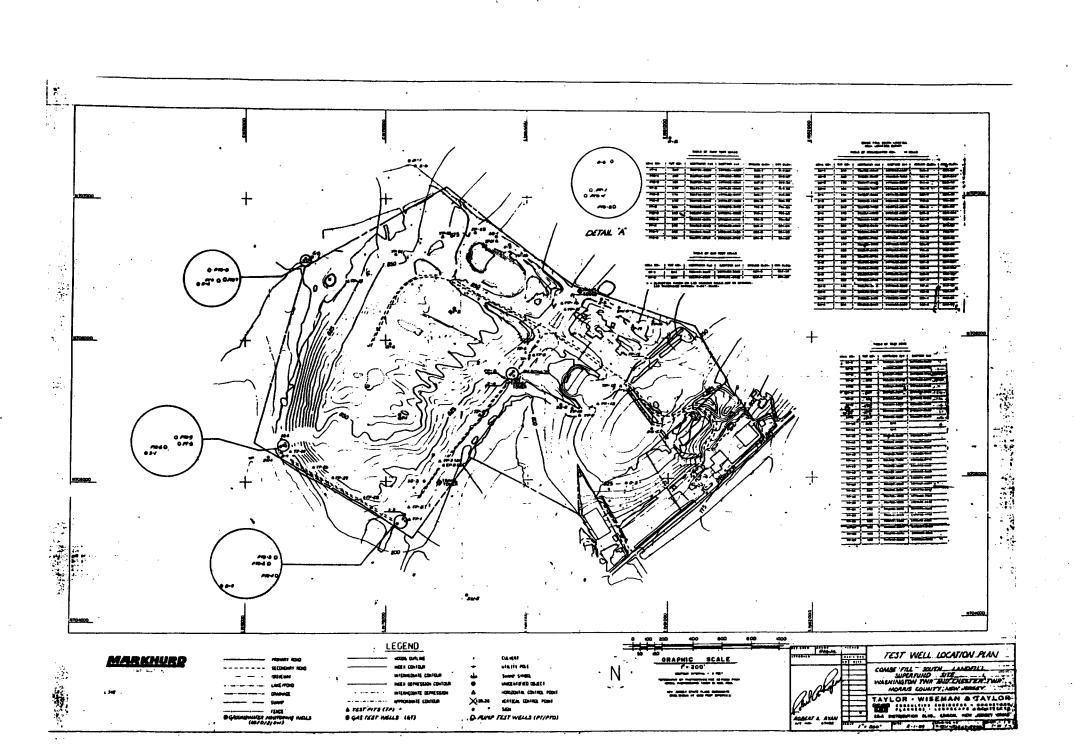
TEST PIT PLOT PLAN

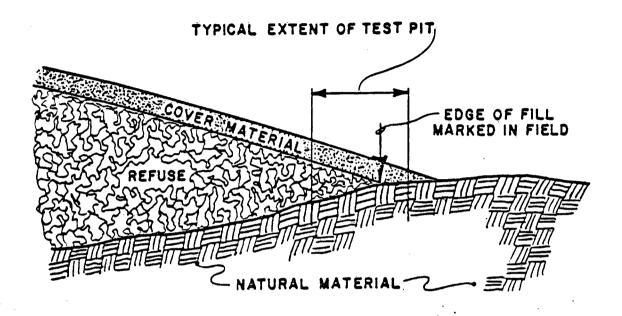
SEE ATTACHED FIGURE #1



Combe Fill South Landfill Table of Test Pits

Well No.	TWT No.	Northing (y)	Easting (x)
TP 1	242	704724.9097	1979170.9678
TP 2	174	704831.5439	1979172.7772
TP 3	171	705137.7161	1979393.1746 (begin)
TP 3	172	705108.9969	1979418.6379 (end)
TP 4	106	705461.5504	1979666.1026
TP 5	107	705723.8099	1979838.1956
TP 6	154	705904.7401	1979991.5406
TP 7	162	705885.1235	1980022,1031
TP 8	163	705886.0052	1980049.5662
TP 9	217	705455.9229	1980377.5139
TP 10	N/A	N/A	
TP 11	N/A	N/A	
TP 12	216	705535.5208	1980503.2394
TP 13	213	705661.9458	1980670.8419
TP 14	221	705506.1642	1980324.7445
TP 15	214	705862.7055	1980853.9415
TP 16	164	706248.7533	1980252.5778
TP 17	227	706092.2822	1980758.4601
TP 18	228	706121.4047	1980903.3158
TP 19	169	706205.6613	1980276.0884
TP 20	235	706605.8342	1979957.4099
TP 21	205	706693.2031	1979778.2193
TP 22	236	706726.1534	1979408.7863
TP 23	237	706752.9238	1979631.1173
TP 24	198	706602.1533	1979074.4662
TP 25	199	706410.6015	1978732.9760
TP 26	182	705097.1800	1978491.6351
TP 27	181	705022.2029	1978629.6828
TP 28	190	704878.8696	1978853.3512
TP 29	183	705208.5823	1978324.3856



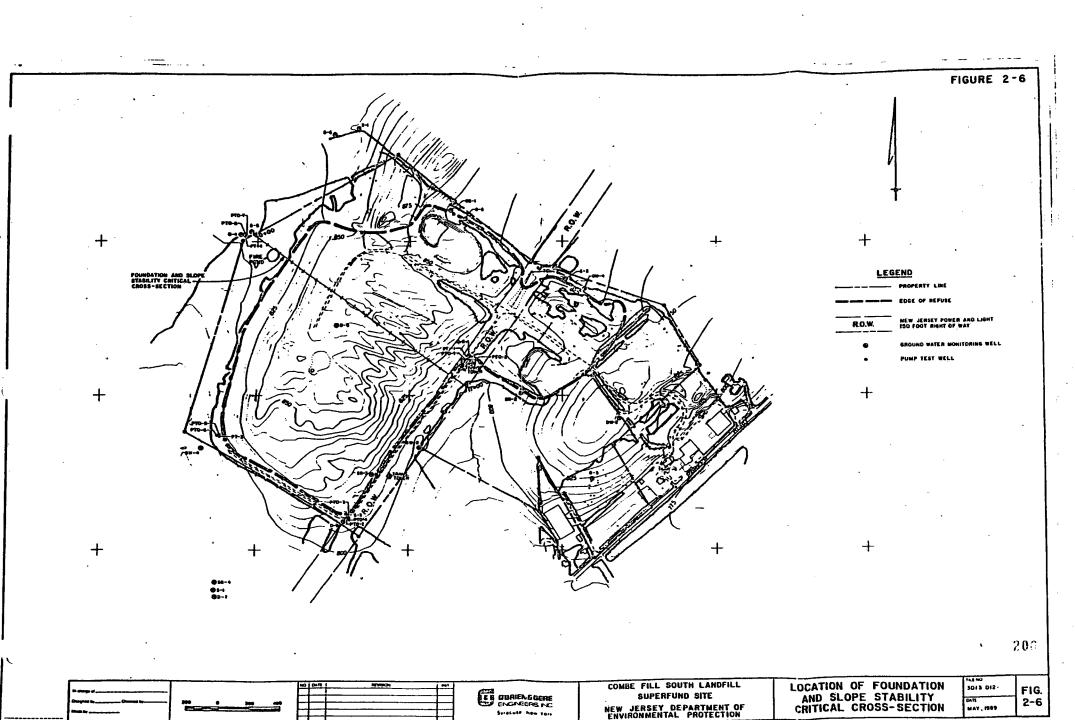


(NOT TO SCALE)

COMBE FILL SOUTH LANDFILL REMEDIAL DESIGN FILL DELINEATION ACTIVITIES

MARCH 1989

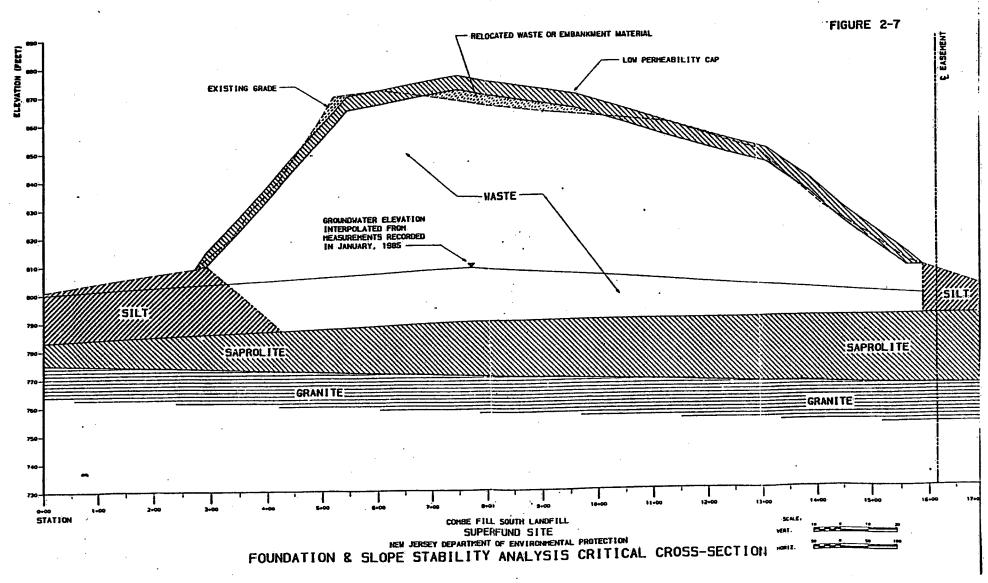
TYPICAL TEST PIT SECTION



NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

2-6

MAY , 1989



IV. Materials Investigation Report



MEMO TO: Files FROM: KM Kohl

DATE: March 3,1989 FILE: 3013.012 #3

RE: Summary of Combe Fill South Landfill Materials Investigation

CC: JJ Keegan RD Jones SW Anagnost

GENERAL

The components of the closure for the Combe Fill South Landfill will utilize a variety of materials, including geosynthetic materials and natural soil materials to be used in the construction of roads, the gas venting system, and cap system. In order to evaluate the natural soil materials to be used in the remedial program, a materials evaluation program was developed as presented in the Field Sampling and Testing Program (FSTP) Report. The purpose of this memo is to provide a summary of the sources and types of materials collected and evaluated for the Combe Fill South Landfill remedial program.

SOIL MATERIALS

As part of the materials evaluation program, a review of the availability of natural materials likely to be used during construction of the Combe Fill South site remedial program was conducted. The United States Department of Agriculture Soil Conservation Service and operators of local borrow areas and quarries were contacted. Following this review, several sites were selected for purposes of collecting samples of the materials.

A total of 11 potential sources of materials were visited during the week of January 9, 1989. Table 1 presents a summary of the samples collected and the respective sources. During that week, 34 samples of materials likely to be used during implementation of the Combe Fill South Remedial program were collected. It is noted that multiple samples were collected from several of the potential sources. Two additional samples were collected on February 3, As discussed in the FSTP, up to five potential borrow 1989. sources for granular materials, five potential borrow sources for low permeability material, and three potential sources of topsoil were to be identified. Table 1 indicates that a total of ten potential sources of granular materials, eight potential sources of low permeability material, and four potential sources of topsoil were identified.

Samples were selected for laboratory analyses according to suitability for intended purpose based on visual observations, quantity of material available, quoted delivered cost, and proximity to the landfill site. Five granular materials, five samples of low permeability materials, and three topsoil samples were submitted for laboratory testing in accordance with the FSTP.

Laboratory testing was performed by Empire Soils Investigations, Inc. located in Groton, New York. In addition, several potential suppliers provided results of laboratory analyses previously performed on samples collected from sources indicated in Table 1. However, these analyses were not performed as part of this investigation. Samples taken from sources where laboratory analyses had been performed previously were not selected for laboratory analyses in order to avoid duplication of information and maximize the amount of laboratory test data available. Attachment 1 to this memo presents the results of the laboratory analyses.

Granular Materials

As discussed in the FSTP, it was intended to sample granular materials to evaluate their suitability in the construction of roads and components of the cap system, including a gas venting layer if required. Two types of granular materials were collected; including crushed stone and sand. It is anticipated that the crushed stone be used in the construction of roads and, if required, the gas venting layer component of the cap system. It is noted that the final cap design incorporates an active gas venting system, and, therefore, the use of a gas venting layer in the cap system is not recommended. Similarly, it is anticipated that the sand materials will be utilized to construct the drainage layer component of the cap. Based on results of the HELP model analyses, it appears that sand materials may meet the minimum hydraulic conductivity requirements for use as the drainage layers.

It is anticipated that materials utilized for construction of the roads will be in accordance with the New Jersey Department of Transportation (NJDOT) specifications. Mechanical grain size analyses for the samples collected were evaluated to determine their suitability for use in road construction with respect to NJDOT specifications. It is anticipated that materials meeting NJDOT specifications for type I-5 material will be utilized for road construction. Based on results of the laboratory tests, it appears that the materials sampled do not meet NJDOT specifications for material type I-5. The materials sampled are uniformly graded and would likely require the addition of fine materials to create a well graded material. Generally, well graded materials are more likely to achieve higher levels of compaction. The materials could be made suitable through the addition of fine grained materials. It is likely that alternate local sources of bank run materials may meet NJDOT specifications.

Table 2 summarizes the estimated hydraulic conductivities for the granular materials analyzed based on the Hazen approximation which is:

$k=100D_{10}^{2}$

where k = hydraulic conductivity (cm/sec)

D₁₀ =diameter of particle where 10 percent of
the material passes by weight (cm)

Materials proposed for use in construction of the drainage layer and gas venting layer, not recommended as a component of the final cap design, should have a minimum hydraulic conductivity of lx10⁻³ cm/sec. In addition, no more than 5 percent of the material should pass the number 200 sieve.

Based on the information presented in Table 2, it appears that sand materials collected from Dallenbach Sand, Mount Hope Rock Products, and Raia Industries meet requirements for use in construction of the drainage layer. These samples have hydraulic conductivities ranging from 1.0x10⁻² to 7.3x10⁻² cm/sec based on Hazen's approximation. The Urbano-9 and Piocosta-18 samples had greater than 5 percent of the material passing the number 200 sieve, which make them unsuitable for use in the drainage layer without additional sieving.

Table 2 indicates that for the crushed stone samples analyzed, the hydraulic conductivities ranged from 1.2 to 64 cm/sec based on Hazen's approximation. Samples obtained from Millington, Mount Hope, Raia Industries, Tri-County, and Urbano appear to meet requirements for hydraulic conductivities greater that 1x10⁻³ cm/sec.

Low Permeability Materials

A total of eight potential sources of low permeability material were identified. The cap will likely incoporate a low permeability Table 3 summarizes the results of the laboratory soil barrier. analyses for the low permeability samples. Results of laboratory analyses for materials obtained from Dallenbach Sand and McNear Excavating were provided by the potential suppliers. these analyses were not performed as part of this investigation. Five additional samples were selected for laboratory testing in accordance with the FSTP and included samples from Berkshire Sand and Gravel, County Sand and Stone, Piocosta, Saxton Falls Sand and Gravel, and Urbano. The Mount Hope and County Sand and Stone samples were collected at a later date than the other samples. Prior to that time, a total of four of the five low permeability samples had been selected for laboratory testing. Based on visual inspection of the samples and available cost information, the County sample was submitted as the fifth sample for testing. required, the Mount Hope samples could be submitted for laboratory testing. All samples are currently being retained at O'Brien & Gere's Syracuse office in the event that additional inspection or testing be performed.

Soil samples were analyzed for the following parameters:

<u>Parameter</u> <u>Standard</u>

Mechanical and Hydrometric Grain Size ASTM D422-63

Moisture Density Relationship

ASTM D698-78 with
15-blow modification

Remolded Permeability with U.S. Army Corps of Back Pressure Saturation Engineers Manual EM110-2-1906

ASTM D4318-73

Appendix VII

Unconsolidated, Undrained (UU) ASTM D2850-82

Triaxial Shear Strength of Compacted Samples

Atterberg Liquid and Plastic Limits

The 15-blow modification to ASTM D698-78 (Standard Proctor Compaction) was used for testing of proposed low permeability materials to model compaction of cover material on municipal solid waste as recommended in the EPA Document 600/2-79-165 "Design and Construction of Covers for Solid Waste Landfills". It is likely that greater compaction could be achieved at the site due to age of the waste and existing cover. Therefore, potential exists to achieve hydraulic conductivities less than those measured with the 15-blow modification. The Standard Proctor Compaction Test requires compaction of a sample in three equal layers in a standard mold. Each layer receives 25 blows from a 5.5 pound hammer falling 12 inches. The 15-blow modification to this procedure provides each layer with only 15 blows, which represents a lesser compactive effort.

Results of the laboratory analyses provided for the Dallenbach and McNear samples indicate that tests were performed in accordance with ASTM D-1557 (Modified Proctor Compaction). The Modified Proctor Compaction Test requires compaction of a sample in five equal layers in a standard mold. Each layer receives 25 blows from a 10 pound hammer falling 18 inches. The Modified Proctor Compaction Test models a greater level of compactive effort. Therefore, the hydraulic conductivities measured with samples prepared in accordance with Modified Proctor Compaction test methods may represent the lower range of hydraulic conductivities for the soil.

Samples obtained from Berkshire, McNear, and Piocosta are classified as silty sands (SM) according to the USCS. Hydraulic conductivities for these samples ranged from approximately 1.4x10⁻⁵ to 1.6x10⁻⁴ cm/sec and are greater than the minimum required permeability of 1x10⁻⁷ cm/sec for the soil barrier layers.

In addition, the McNear and Piocosta samples are classified as non-plastic. The Berkshire sample has a plasticity index of 1. Based on the results of the laboratory analyses, it appears that these soils are not suitable for use in construction of the soil barrier layers. However, it is possible that they could be made suitable by the addition of bentonite.

The sample obtained from Saxton Falls is classified as a low plasticity silt (ML). This material is a product of a crushed stone washing process at the quarry and only a limited amount of the material, approximately 33,000 cubic yards, is likely to be available. Laboratory results indicate that the hydraulic conductivity for the material is approximately 9.7x10⁻⁶ cm/sec, exceeding the minimum requirement for use in construction of the soil barrier layers. The addition of bentonite could potentially allow the material to meet hydraulic conductivity requirements.

The sample obtained from County Sand and Stone is classified as a highly plastic clay (CH). Hydraulic conductivities for the sample were in the range of 1.94x10⁻⁶ to 2.28x10⁻⁶ cm/sec. The material has a plasticity index of 59. Based on information presented by Seed et al. (1962) in An Introduction to Geotechnical Engineering by R.D. Holtz and W.D. Kovacs, the clay may have the potential to swell. The potential to swell can be assessed through expansion or swell laboratory tests if this is deemed necessary.

The sample obtained from Urbano is classified as a low plasticity clay (CL). The hydraulic conductivities for the sample ranged from 1.2 to 1.4x10⁻⁷ cm/sec. It is important to note the observations made during laboratory analyses of the sample by the soils A description of the behavior of the sample is laboratory. included in Attachment 1 to this memo. Prior to testing, the sample was dried in an oven. After this initial drying, the sample had the appearance of cinders. Material retained on the number 4 sieve was washed with tap water, and the material immediately dissolved, leaving approximately 0.4 pounds of orange gravel which stained the skin orange. According to the laboratory report, the sample had an unusual but unidentifiable odor. Oven dried samples taken after the permeability test had been completed indicated that the sample again had the appearance of cinders. The samples were uneven in color, with some areas having the appearance of still being wet or possibly containing a foreign substance. Although the hydraulic conductivities are near those required for construction of the soil barrier layers, the behavior of the soil indicates that it may not be suitable for use in construction of the cap system.

Laboratory analyses for the soils present at the Dallenbach site indicate the soil is classified as a low to high plasticity clay (CL/CH) according to the USCS. Hydraulic conductivities for the samples ranged from 2.0×10^{-9} to 2.3×10^{-7} cm/sec. It is noted that the laboratory tests were performed with samples that had been prepared to 95 percent compaction as per the Modified Proctor

Compaction test. As previously indicated, the hydraulic conductivities measured with samples prepared in accordance with Modified Proctor Compaction test methods may represent the lower range of hydraulic conductivities for the soil. It appears that clay soils obtained from this site have the potential to meet the requirements for the soil barrier layers. However, the material is obtained as a result of a wet mining process used to obtain sand material from adjacent soil layers. Consequently, the quantity of material available may be dependent on the efficiency of the mining operation and time required to dry the material following mining. In order to assess the hydraulic conductivity of the soil with the 15-blow modification to the Standard Proctor Compaction test, additional testing may be performed.

Topsoil
A total of four potential sources of topsoil were identified.
Table 4 presents the results of laboratory tests performed on three of the potential topsoil sources. The source from which the Urbano topsoil sample was obtained is likely to change. In that case, additional analyses would be required to evaluate the suitability of the topsoil from the new source if that source was selected for use in the cap system. A topsoil sample to be sent by Berkshire Sand and Gravel had not arrived as of March 3, 1989 and was not included in the laboratory testing program. In addition, the other suppliers had indicated that the entire quantities required could be supplied and were, therefore, considered to be preferable sources.

The topsoil will promote growth of a vegetative layer which will stabilize the cap, promote run-off, maximize evapotranspiration, minimize infiltration, and minimize soil erosion. In addition, the topsoil should be capable of supporting a vegetative species which is adapted to the climate of the region, relatively quick growing, shallow rooted, able to grow year round, self propogating, and require a minimum of short and long-term maintenance. The vegetation should be hardy enough to withstand severe exposure periods on the open expanse of the landfill face and should be able to withstand attack by indigenous diseases or insects.

The samples were analyzed for the parameters listed in Table 4. In order to evaluate the suitability of these soils for support of a local vegetative species on the landfill cap system, the Morris County Soil Conservation Service was contacted. A copy of the correspondence from the Soil Conservation Service is included in Attachment 2 to this memo. Results for only the Como and Piocosta topsoil analyses were forwarded to the Soil Conservation Service. Results for the third topsoil sample from Urbano were not available at the time the other test results were forwarded to the Soil Conservation Service, the levels of the macronutrients nitrogen (N), phosphorous (P), and Potassium (K) and micronutrients are unusually low for the Como and Piocosta samples. In addition, the pH levels are 1 or 2 units

higher than is typical for the upland soils in Morris County. The organic matter levels are within the normal range for the A horizon of most of the well-drained soils in Morris County. The cation exchange capacity (CEC) levels were low for the Como and Piocosta samples. Based on recommendations by the Soil Conservation Service, it appears that the materials are suitable as a growth medium for sod.

Levels of the parameters evaluated for the Urbano sample were generally within the ranges of those measured for the Como and Piocosta samples with the exception of potassium (K), iron (Fe), aluminum (Al), manganese (Mn), organic matter, nitrate (NO_3) , and cation exchange capacity, which were detected at higher levels. The pH level for the Urbano sample was 5.12, slightly lower than the levels measured for the Como and Piocosta samples.

As per recommendation by the Morris County Soil Conservation Service, the Morris County Cooperative Extension Office was contacted to provide additional information regarding analyses to determine the suitability of these soils for support of a vegetative species on the landfill cap system and recommendations for corresponding suitable vegetative species. Any additional required analyses can be performed by the Cooperative Extension. A summary of comments made by the Cooperative Extension will be included when the information becomes available.

SYNTHETIC MATERIALS

As part of the materials evaluation program, a review of synthetic materials to be used in the construction of the cap system was performed. The materials evaluated include geomembranes, geotextile, and geosynthetic materials likely to be utilized as the surface water collection removal systems (SWCR).

Three types of materials for use as flexible membrane covers (FMC) were evaluated including high density polyethylene (HDPE), polyvinyl chloride (PVC), and chlorosulfonated polyethylene (CSPE). Based on available literature, it appears that the angles of internal friction developed at the PVC and geotextile or sandy soil interfaces are generally greater than those developed at smooth HDPE and geotextile or sandy soil interfaces. However, a textured HDPE liner has been developed by Gundle Lining Systems, Inc. which is manufactured with a specially treated surface which increases the angle of friction. The angles of internal friction developed at the interface of the textured material and adjacent soil or geosynthetic materials appear to be equal to or significantly greater than those developed at the rough PVC or CSPE interfaces. It is not meant to specify products manufactured by Gundle Lining Systems in particular, although Gundle appears to be the only manufacturer of textured HDPE material.

Based on manufacturer's literature, it appears that PVC materials have higher elongations at yield than HDPE and CSPE materials. Therefore, it is likely that PVC materials have significantly larger factors of safety with respect to strains at rupture to avoid FMC failure due to settlement, as presented in the memo to files dated February 21, 1989.

It is noted that geosynthetic materials used as FMCs are generally exposed to surface water infiltration only. As a result, chemical compatibility is generally not a concern. However, HDPE materials are generally chemically resistant to a wider range of parameters than PVC and CSPE materials. In summary, PVC materials appear to be more advantageous in cases where the FMC is likely to be subjected to significant settlements because of their more favorable stress-strain characteristics. In cases where chemical compatibility is of a concern, the use of HDPE materials may be more favorable because of their resistance to a wider range of chemicals. Recognizing that a 2 foot thick soil barrier layer will likely separate the waste layer from the FMC in the selected cap design and that settlement of the cap system is a concern, a FMC manufactured of PVC appears to be most appropriate.

Geotextile materials proposed for use in the cap system as filter fabrics were evaluated. Generally, these materials consist of nonwoven polypropylene. The properties of Mirafi 140N were used in the analyses, to determine if the material would meet requirements for permittivity and filtration for use in the cap systems based on results of the HELP model runs. This is not meant to specify Mirafi materials in particular. It is likely that several other filter fabrics would be capable of meeting the appropriate filter criteria. Based on available information, it appears that the material should meet requirements for permittivity and filtration. In addition, it appears that the material has sufficient strain at rupture to avoid failure due to settlement.

Two types of materials were evaluated for use in the cap system as the surface water collection/removal system (SWCR). materials include geonet material manufactured of HDPE and a geocomposite material manufactured from HDPE with geotextile materials heat sealed over both sides of the geomet. properties of Gundnet XL-4 were used to evaluate the geonet. Properties corresponding to Tenax TNT material were used to evaluate the geocomposite material. As previously discussed, this is not meant to specify these materials in particular. properties were used as a basis for determining the general material properties of such materials. Based on analyses performed and available information, it appears that the geomet material manufactured by Gundle or a material with similar characteristics will provide sufficient transmissivity for use as the SWCR layer. It is noted that information regarding the tensile strength of the geonet material was requested from the manufacturer to evaluate the likelihood of failure due to shear of the geonet and if the

material has sufficient strain at rupture to avoid failure due to settlement. However, this information does not appear to be readily available. In the event that a design is selected which incorporates a geonet, it is recommended that laboratory tests be performed to determine these properties or that additional information be obtained.

Based on available information, it is likely that the geocomposite material Tenax material or a material with similar characteristics would have tensile properties sufficient to avoid failure due to shear or due to settlement. However, analyses based on available information indicate that the material may not provide sufficient transmissivity, as documented in the memo of February 21, 1989.

GABIONS

It is anticipated that gabion walls may be used as retaining structures to stabilize the cap system near the edge of waste. The use of gabion walls decreases additional quantities of materials required for cap construction beyond the limit of waste deposits. Manufacturer's literature provided by Maccaferri Gabions was reviewed. This is not meant to specify Maccaferri gabions in particular. Maccaferri heavy duty gabions are rectangular baskets made of zinc-coated steel wire mesh of double twist hexagonal weave having openings of 3.25 by 4.50 inches. Each gabion is subdivided into cells of equal size by diaphragms.

At the construction site, the gabions are unfolded and assembled by simply lacing the edges together and fixing the diaphragms to the sides. The individual gabion units are then laced to each other and filled with stone 4 to 8 inches in diameter. The lids are then closed and laced to the top edge of the individual gabions.

Maccaferri also manufactures gabions with a PVC coated mesh. Due to their greater resistance to corrosion, it is recommended that these gabions be used at the landfill as the manufacturer indicates that these gabions be utilized in cases where the soil or water is acidic, in salt or brackish water, or wherever the risk of corrosion is present.

Table 5 summarizes potential suppliers for material which may be used to fill the gabions. It is noted that no samples were collected from these potential suppliers. Based on information presented in Table 5, it appears that there are several sources which are capable of supplying an estimated quantity of 8,100 cubic yards of stone suitable for use in gabion construction.

SUMMARY

Results of the materials investigation indicate that sufficient quantities of materials likely to be used in the construction of the topsoil, vegetative, and drainage layers and gabion walls appear to be available within a 35-mile radius of the site.

Samples collected for use as low permeability material to be used in the construction of the soil barrier layer were tested in the aboratory with the 15-blow modification to the Standard Proctor Compaction test in order to model the compaction of cover material on municipal waste. Based on the results of these tests, several of the samples do not appear to be suitable for use in the construction of the soil barrier layer with respect to the measured hydraulic conductivities. However, it is possible that these materials could be made suitable through the addition of bentonite. In addition, it is likely that greater levels of compaction could be achieved at the site due to age of the waste and the presence of an existing cover.

Laboratory analyses for soils available from the Dallenbach Sand and Stone site indicate that the hydraulic conductivity ranges from 2.0x10⁻⁹ to 2.3x10⁻⁷ cm/sec. It appears that these soils bave the potential to meet the requirements for use in the construction of the soil barrier layers. However, the quantity of material available may be dependent on the efficiency of the wet mine operation used to obtain the soil. In general, it appears that sufficient quantities of material with the potential to meet requirements for the soil barrier layer through the addition of bentonite are available within a 35-mile radius of the site.

Geosynthetic materials proposed for use in the construction of the cap system were also evaluated. In general, it appears that PVC, SPE, and HDPE materials are acceptable for use as the FMC component of the cap system. PVC materials appear to be more advantageous in cases where the FMC is likely to be subjected to significant settlements because of their more favorable stress-strain characteristics. In cases where chemical compatibility is of a concern, the use of HDPE materials may be more favorable because of their resistance to a wider range of chemicals. Recognizing that a 2 foot thick soil barrier layer will likely separate the waste layer from the FMC in the selected cap design and that settlement of the cap system is a concern, a FMC manufactured of PVC appears to be most appropriate.

Geotextile materials manufactured of nonwoven polypropylene appear to meet requirements for permittivity and filtration in the cap system. It is likely that several other filter fabrics would be capable of meeting the appropriate filter criteria.

Geosynthetic materials evaluated for use in the cap system as the surface water collection/removal system (SWCR) include a geonet material manufactured of HDPE and a geocomposite material consisting of a geonet manufactured of HDPE with geotextile materials heat sealed over both sides of the geonet. Based on the analyses performed and available information, it appears that the geonet has the ability to provide sufficient transmissivity for the SWCR layer. However, information regarding the tensile strength f the material was not readily available and the likelihood of

failure due to shear of the geonet was not evaluated. The eocomposite material did not appear to provide sufficient ransmissivity for the SWCR layer.

Source	Date Sampled	Sample Number	Sample Description	Intended Use of Material	Remarks
Dallenbach Sand Co., Box 333 Dayton, NJ 08810 (201)-297-3381	1/10/89	2 4 5	Clay ** Concrete Sand ** Masonry Sand **	Low Permeability Material Drainage Layer Material Drainage Layer Material	Clay is material obtained during wet mine operation. As a result, material availability is dependent on dredging process and time required for material to dry.
Millington Quarry, Inc. Stonehouse Road P.O. Box 407 Millington, NJ 07946 (201)-580-3910	1/10/89	3	3/4 inch crushed stone	Gas Venting Layer, Roads	Crushed rock materials obtained from quarry in Wharton, NJ.
Dan Como & Sons	1/10/89	1	Screened Topsoil	Topsoil	
(201)-263-0440					
McNear Excavating Box M503 Landing, NJ 07850 . (201)-398-9232	1/10/89	6 7 8	Common Fill ** Common Fill ** 3/4 inch crushed stone	Low Permeability Material Low Permeability Material Drainage Layer Material	Note that samples 6 and 7 are of the same material. However, these materials appear to differ significantly in gradation. Sample 6 represents the more predominant coarse fraction of the material, whereas sample 7 was collected from a limited area where soils were composed of a larger fraction of fine materials.

NOTES:

CO

^{1. **} indicates that potential supplier provided results of laboratory analyses performed for samples obtained from source indicated. However, these analyses were not performed as part of this investigation.

page 2 of 3

TABLE 1 (CONTINUED) COMBE FILL SOUTH MATERIALS EVALUATION

Source	Date Sampled	Sample Humber	i Sample Description	l Intended Use of Material	Remarks
ID. Urbano Trucking, Inc. 1373 Route 22 East Green Brook, HJ 08812 (201)-469-2470 	1/11/89	11 and 12 10 9 13	11.5 inch crushed rock I from Bound Brook area ISand from Honroe Tup,	lGas Venting Layer, Roads	lHote that the sources of the Isand and topsoil materials lare likely to change within Ithe near future.
	1/11/89	14 15 16 17 18 19	I"Clay" material unscreened I"Clay" material screened IConcrete sand IScreened Bank Run Sand	l Topsoil Low Permeability Material Low Permeability Material Drainage Layer Material Drainage Layer Material Bas Venting Layer, Roads	 All materials obtained from same site.
	1/11/89	20 21 22 23	ISandy Bank Run IPondfill	lGas Venting Layer, Roads Drainage Layer Material	Pondfill is material obtained from washing plant settlement loond. Screened fill is loombination of topsoil and land from embankment.
	1/11/89 1/11/89 2/3/89		ISano	l Gas Venting Layer, Roads Drainage Layer Material Low permeability material	Ifrom Jackson, Hew Jersey.

NOTES:

1. ## indicates that potential supplier provided results of laboratory analyses performed for samples obtained from source indicated. However, these analyses were not performed as part of this investigation.

TABLE 2-11 (CONTINUED) COMBE FILL SOUTH MATERIALS EVALUATION

Source	Date Sampled	Sample Number	Sample Description	Intended Use of Material	Remarks
Tri-County Asphalt, Corp. Lake Hopatcong, NJ (201)-663-2010	1/11/89	26 27	3/4 inch crushed stone 1.5 inch crushed stone	Gas Venting Layer, Roads Gas Venting Layer, Roads	
Berkshire Valley Sand and Gravet Berkshire Valley Road Oak Ridge, NJ (201)-697-4800	1/12/89	28 29 30 31	Concrete Sand 3/4 inch gravel (rounded) 3/4 inch crushed rock "Clay" material	Drainage Layer Material Gas Venting Layer, Roads Gas Venting Layer, Roads Low Permeability Material	To provide sample of topsoil.
Raia Industries, Inc. Hamburg, NJ (site) (201)-488-0500	1/12/89	32 33 34	Minus 3/8 inch Sand Fill 3/4 in. crushed stone Concrete Sand	Drainage Layer Material Gas Venting Layer, Roads Drainage Layer Material	
County Sand & Stone Noorestown, NJ (609)-234-7263	2/3/89	36	Clay	Low Permeability Material	

NOTES:

1. ** indicates that potential supplier provided results of laboratory analyses performed for samples obtained from source indicated. However, these analyses were not performed as part of this investigation.

TABLE 2-12 COMBE FILL SOUTH LANDFILL MATERIALS INVESTIGATION SUMMARY OF LABORATORY ANALYSES FOR GRANULAR MATERIALS

			**********		********
ALUDI C	010 (cm)	k=1000102 (cm/sec)	PERCENT PASSING NUMBER 200 SIEVE	SOURCE OF LABORATORY ANALYSES (1)	QUANTITY AVAILABLE (2) (cubic yards)
SAMPLE	*********				40,000
Berkshire - 28 Concrete Sand	N/A	N/A	N/A	n/A	40,000
Dailenbach -4 Concrete Sand	0.027	7.3x10-2	0.9	Supplier	58,000 (4)
Dallenbach -5 Masonry Sand	0.02	4.0x10-2	0.9	Supplier	58,000 (4)
Mount Hope - 24 Washed Stone Sand	0.021	4.4x10-2	1.9	Supplier	116,000
Piocosta - 17 Concrete Sand	N/A	N/A	N/A	N/A	58,000
Piocosta - 18 Screened Bank Run Sand	0.01	1x10-2	8	Empire Soils	58,000
Raia Industries - 34 Concrete Sand	0.02	4.0x10-2	3.5	Supplier	116,000
Raia Industries - 32 -3/8 Sand Fill	0.01	1.0x10-2	4.8	Supplier	116,000
Saxton Fells - 21 Sandy Bank Run	N/A	N/A	N/A	N/A	66,000
Urbano - 9 Sand	0.0074 (5)	5.5x10-3	11.5	Empire Soils	116,000
Berkshire - 29 3/4 inch rounded gravel	N/A	N/A	N/A	N/A	50,000
Berkshire - 30 3/4 inch crushed stone	N/A	N/A	N/A	N/A	50,000
McNesr Excavating - 8 3/4 inch crushed stone	N/A	N/A	N/A	N/A	123,000
Millington - 3 3/4 inch crushed stone	0.11	1.21	0	Empire Soils	123,000
Mount Hope - 24' 3/4 inch crushed stone	0.8	64	0	Supplier	123,000
Piocosta - 19 1.5 inch crushed stone	N/A	N/A	N/A	H/A	50,000
Raia Industries - 33 3/4 inch crushed stone	0.8	64	0	Supplier	123,000
Saxton Fails - 20 3/4 inch crushed stone	N/A	N/A	N/A	N/A	26,000
Tri-County - 26 3/4 inch crushed stone	0.12	1.4	0	Empire Soils	123,000
Tri-County - 27 1.5 inch crushed stone	N/A	N/A	N/A	N/A	123,000
Urbano - 10 1.5 inch crushed stone	0.19	3.6	²	Empire Soils	123,000

 (3) Indicates costs are based on November, 1988 costs for material deliverd to site.
 (4) Indicates supplier indicated that total quantity available may be 116,000 Cubic yards, based on use of both types of sands.

(5) Indicates 010 estimated on percent passing the number 200 sieve, where 11.5 percent pass the number 200 sieve.

⁽¹⁾ Indicates that potential supplier provided results of laboratory analyses performed for samples obtained from source indicated. However, these analyses were not performed as part of this investigation.
(2) Indicates estimated quantity available for 1989-1990.

TARIE 2-17

COMBE FILL SOUTH LANDFILL MATERIALS INVESTIGATION SUMMARY OF LABORATORY ANALYSES FOR LOW PERMEABILITY SOILS

SAHPLE,	USCS CLASSIFICATION	MOISTURE DENSITY (2) (LB/FT3)	PERCENT MOISTURE (2)	HYDRAULIC CONDUCTIVITY (2) (CM/SEC)	LIMIT	PLASTIC LIMIT		SHEAR STRENGTH (LB/IN2)		QUANTITY AVAILABLE (4) (cubic yards)		APPROXIMATE DISTANCE FROM SITE (miles)
Berkshire - 31	SH	113.2	15.1	1.37x10-5 1.50x10-5	21	20	1	31.2	Empire Soils	30,000	\$18.00	25
County Sand & Stone - 36	СН	89.0	27.4	1.94×10-6 2.28×10-6	87	28	59	26.1	Émpire Solls	233,000	\$20.00	80
Dallenbach - 2	CH - sample 1 CL - sample 2	114.1 - sample 1 (3) 114.8 - sample 2 (3)	N/A N/A	2.28x10-7:sample 1 (3) 2.0x10-9:sample 2 (3)	54 H/A	38 N/A	16 H/A	N/A N/A	Supplier Supplier	233,000 (6)	\$18.00	35
McNear - 6				1.02x10-4:sample 1 (3) 1.63x10-4:sample 2 (3)	NP NP	NP NP	NP NP	NP NP	Supplier Supplier	233,000	\$10.00	15
Mount Hope - 35	N/A	N/A	H/A	N/A	N/A	H/A	N/A	N/A	N/A	233,000	\$10.00	70
Piocosta - 16	SM	130.6	9.4	4.9×10-5 4.6×10-5	NP	22	NP	27.1	Empire Soils	233,000	\$20.00	15
Saxton - 22	. ML	108.3	17.3	9.5x10-6 .9.7x10-6	23	20	3	24.2	Empire Soils	33,000	\$8.00	10
Urbano - 11 (6)	CL	90.6	25.5	1.2x10-7 1.4x10-7	44	24	20	28.9	Empire Soils	233,000	\$22.00	40

NOTES:

- (1) Indicates that potential supplier provided results of laboratory analyses performed for samples obtained from source indicated. However, these analyses were not performed as part of this investigation.
- (2) Indicates that moisture density relationships and corresponding permeability tests were performed with the 15 blow modification to ASTM D-698 unless otherwise noted.
- (3) Indicates that these tests were performed in accordance with ASTM D-1557 Method C, Modified Proctor methods.
- (4) Indicates estimated quantity available for 1989-1990.
- (5) Indicates costs are based on November, 1988 costs for material delivered to site.
- (6) indicates quantity available is based on efficiency of met mining process used to obtain the material.
- (7) NP indicates Non-Plastic.

(L)

- (8) N/A indicates not ascertained.
- (9) See note from Empire Soils regarding behavior of soil observed during laboratory analyses in Attachment 1.

TABLE 2-14 COMBE FILL SOUTH LANDFILL MATERIALS INVESTIGATION SUMMARY OF LABORATORY ANALYSES FOR TOPSOIL

	SAMPLE COMO-1	SAMPLE PIOCOSTA-14	SAMPLE URBANO-13 (5)
PERCENT PASSING NUMBER 200 SIEVE	24.2	33.3	60.0
MOISTURE DENSITY (1) (LB/FT3)	114.6	117.4	105.7
PERCENT MOISTURE (1)	15.1	12.8	19.2
Phosphorous, available (mg/Kg)	2.4	2.5	2.2
Potassium, available (mg/Kg)	27	37	49
Magnesium, available (mg/Kg)	109.7	398.1	148.9
Calcium, available (mg/Kg)	754	1383	722
Iron, available (mg/Kg)	7.5	1.2	29.7
Aluminum, available (mg/Kg)	25.3	16.7	67.6
Manganese, available (mg/Kg)	8.2	11.7	85.7
Zinc, available (mg/Kg)	0.68	0.37	0.90
Copper, available (mg/Kg)	-0.3 (4)	-0.4 (4)	0.4
pH, in water	6.87	7.49	5.12
Organic Matter LOI percent	2.50	3.54	5,95
NO3, available (mg/Kg)	6.85	25.14	32.03
NH3, available (mg/Kg)	4.4	1.2	4.0
CEC-NH40Ac cmol/Kg	6.61	9.09	17.55
Exchange Acidity (cmol/Kg)	H/A	N/A	8.37
QUANTITY AVAILABLE (2) (cubic yards)	59,000	59,000	59,000
COST per cubic yard (3)	\$25.00	\$26.00	\$20.00
APPROXIMATE DISTANCE FROM SITE (miles)	30	15	20

NOTES:

- (1) Indicates that moisture density relationships were performed with the 15-blow modification to ASTM D-698 (Standard Proctor Compaction).

- (2) Indicates estimated quantity available for 1989-1990.
 (3) Indicates costs are based on November, 1988 costs for material delivered to site.
 (4) A minus sign indicates analyte at limit of detection, it does not indicate analyte at limit of detection. indicate a negative result.
- (5) Indicates source of material likely to change.(6) N/A indicates Not Ascertained.

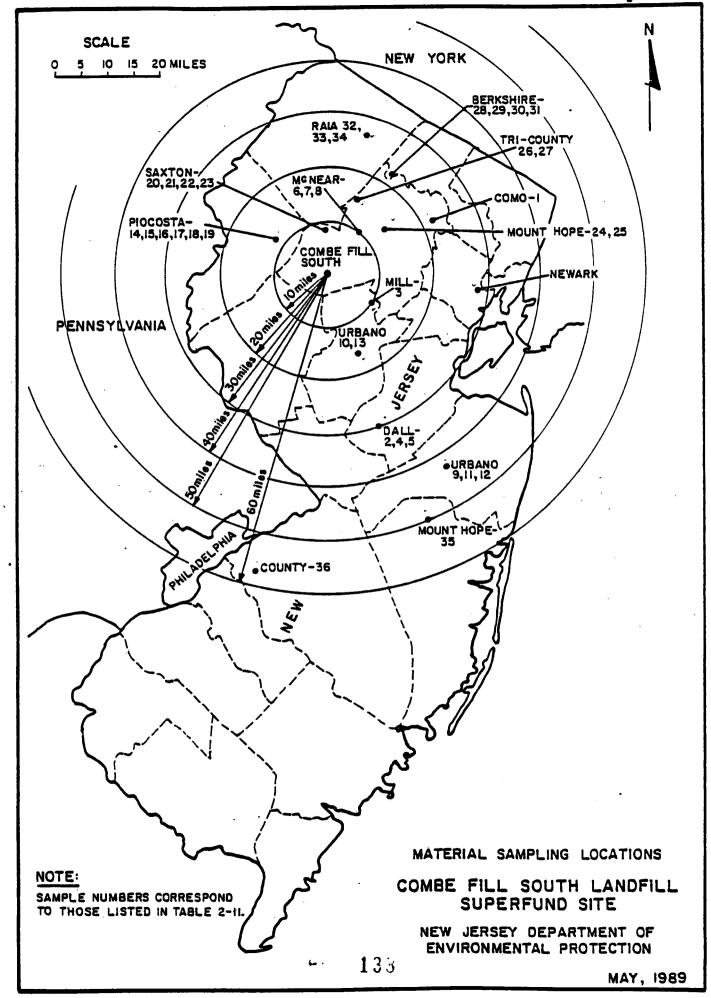
TABLE 2-15

COMBE FILL SOUTH MATERIALS INVESTIGATION
SUMMARY OF POTENTIAL SOURCES FOR GABION FILL MATERIAL

	GUANTITY AVAILABLE (1) (cubic yards)	COST (per cubic yard) (2)	APPROXIMATE DISTANCE FROM SITE (miles)
McNear Excavating	 22,000 	\$15.00	 15
Millington Quarry	 22,000	\$21.00	 15
Piocosta Sand and Gravel	 22,000 	\$22.00	 15
Raia Industries	 22,000 	\$26.00	 30
Saxton Falls Sand and Gravel	 22,000 	\$20.00	 10
 Tri-County Asphalt	 22,000 	 \$17.00 	 20
Úrbano	 22,000 	 \$22.00 	 25

NOTES:

- (1) Indicates estimated quantity available for 1989-1990.
- (2) Indicates costs are based on November, 1988 costs for material delivered to site.



V. Subsurface Foundation Evaluation

MEMO TO: Files

FROM: KMKohl LML

DATE: 6/25/90 'FILE: 3013.012 #3

RE: Combe Fill South Landfill - Geotechnical Investigation

for Ground Water Treatment Plant and Blower Building

CC: SWAnagnost

RFBrodowski AJCaracciolo RJ Cosselman

ACJarka RDJones JJKeegan JRKnox CBMurphy SJRoland AJSaikkonen GASwenson

GENERAL

The geotechnical investigation for the proposed ground water treatment plant and blower building included soil borings and rock coring. A total of eight (8) borings were installed to provide information regarding subsurface conditions at the proposed locations. Rock coring was performed at two (2) of the locations. The purpose of this memo is to summarize the results of the subsurface investigation. In addition, recommendations estimates of settlement and bearing capacity are presented.

SUBSURFACE CONDITIONS

Locations of the soil borings are shown on Figure 1. The building and tank layout shown on Figure 1 may be modified as part of the Final Design. It should be noted that soil borings were installed at locations determined by taped distances from previously surveyed locations. Borings were installed in accordance with the Geotechnical Investigation Work Plan provided to the New Jersey Department of Environmental Protection (NJDEP). Continuous split spoon samples were obtained in accordance with ASTM D-1586. One additional boring, boring BB-6A, was installed approximately 3 feet from BB-6 to confirm the presence of a continuous hard layer. Rock coring was performed at the locations of BB-3 and BB-7. Shelby tube samples were not collected due to the cohesionless nature of the soils.

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In general, subsurface conditions consist of a thin layer of topsoil overlying a layer of medium dense to very dense sand and saprolite 5 to 9 feet in thickness. (Saprolite is defined as a soft, earthy, clay-rich thoroughly decomposed rock formed in place by chemical weathering of igneous or metamorphic rock.) Grey-green to grey-black, moderately weathered, and moderately fractured granite underlies the sand and saprolite layer and was encountered at depths ranging from approximately 5 to 9 feet below ground surface. Boring logs and rock coring logs are presented in Attachment A. Attachment B includes field notes recorded during the subsurface investigation.

RECOMMENDATIONS

Bearing Capacity

The recommended bearing capacity is estimated based on information presented in Foundation Engineering (R.B. Peck, W.E. Hanson, and T.H. Thornburn (1974)) and the SPT values recorded during the field In general, SPT "N" values recorded within the investigation. upper two feet of the soil borings were significantly lower than values recorded at increasing depths. The low N values may be attributed to the thin layer of topsoil near ground surface. values recorded at depths greater than two (2) feet below ground surface ranged from 28 (BB-3, depth=4 ft) to 100 or refusal. average N value for the sand and saprolite layer is 56. This value was determined by neglecting all N values recorded within the upper two (2) feet of ground surface. Based on Peck et al. the sand and very dense material. saprolite layer is classified as a Information presented in NAVFAC DM-7.2 -Foundations and Earth Structures, Department of the Navy indicates that an allowable bearing pressure of 4 tsf (8000 psf) may be used for the in-situ Sand and saprolite soil excavated and recompacted is anticipated to have an allowable bearing pressure of equivalent natural soil. An allowable bearing capacity in the range of 10 tsf = 20,000 psf is recommended for foundations bearing on the granite layer.

2

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Estimated Settlements

Settlement estimates were performed using methods presented in Transmission Line Structure Foundations for Up-lift Compression Loading (Cornell University Geotechnical Engineering Group, F.H. Kulhawy, 1983). Based on the cohesionless nature of the soils encountered at the site, it is assumed that elastic settlements would occur simultaneously during load application. Settlement analyses are included in Atttachment C. Results of the settlement analyses are as follows:

Comp: Structure	Assumed ressive Load (psf)	<u>Cente</u>	<u>Settlemen</u> er Edge D (inches)	t Differential
Tanks	1000	0.20	0.13	0.07
Gas Extraction Building	250	0.08	0.07	0.01
Process Equipment Building	250	0.12	0.06	0.06

Notes:

- * indicates that the settlement was calculated for the largest diameter tank (diameter=32 ft) and represents a conservative value.
- 2. Methods used to estimate settlements assume a soil of infinite depth and represent an upper bound of the elastic settlement.

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ATTACHMENT A

SOIL BORING LOGS

		, FIE						oring no. B					
OSTIE	יי דמ	cation: (South JDE	ombe f Landfi P	711	T H Fi	Li 30 inches Fill	unimiter No grand water incountered during soil boring LENG: 3013.012 # 4						
.16 Fuk 04 036 H1	CD. : W: DROG	aroei21: : 8 ≠	Boug Kari	Myero Myero M. M.				end s	13	0/90			
DEPTH	No.	DEPTH	SWPLE BLOKS /6"	PENETRIV RECOVERY	"N"	SAMPLE DESCRIPTION	STRTUM CHANGE DEPTH	EDITARENT		EDUIPHENT INSTRLLED			
						Dark brown Topsoil	0.33				Ť		
0-2	1	2.	3-9	1.0'	4	fine (+) to medium (-)					T		
						to coarse (-) SAND, trace silt, clay							
\longrightarrow		3,51		1.5	57	Very dense moist, light brown fine (+) to medium	-)	·					
	215	4.0'	40-48	·	•	to coarse (-) SAND Trace sitt, clay	3.5'	·					
						SAPROLITE and decomposing	ed 40'	·					
4-6	3	6.0'	20-21		4-4-								
			20 -24 40 -40		64	7				-			
8-9	5	9.0	15-100/5"	08'	100+	as above		-					
9'	-					Rods bouncing @ 9.01	9.0						
						B. O. B. @ 9.0'							
•	!						<u>.l</u>	 	\$ %	22	l		

576 0, 8	RVE INEER	i, Fie				TEST PORTING LOG RE	PORT OF E	ORING NO. 3	6-2	2 SHEET #4	42		
PROJE	7: S	cation: (outh IJDE	lombe Landf P	FIL	H	YPE: 14-0 lbs,	encountered during soil boring. FILE NO.: 3013.012 # 4						
BY FOREA OB6 H	; CD. AN: YDROS	EDLOGIST:	B Drill 19 Myu Karin	chin M. K	Cohl	BORING LOCATION: 38-3 GROUND ELEVATION: DATES: Started S							
DEPTH	No.	DEPTH	BLOWS /6°	PENETRIAL RECOVERY	"N"	SAMPLE DESCRIPTION	STRTUM CHANGE DEPTH	EQUIPMENT INSTALLED		ENIPPERT INSTALLED	R M K S		
0-2	1	2.0	1-2	1.0'	3	Very lowse, moist, light brown, fine (+) to medium (-) to coarse (-) SAND, trace silt, clay, roots	1						
			4-50 34-33	1.61	84	Very dense, moist, light brown fine to medium SAND and SAPROLITE, trace fine to medium gravel (ZA) Damp. light green,	2.5						
4-10	3	6,0	22-37 32-37	1.5'	69	SAPROLITE and We ethered gravite as above with trace fine				•			
ر'ج' <u>ن</u>	4	7.8'	43-65 70-19/3"		100+	gravel, clay, silt. (Note gravel is granife fragments): as above, some iron staining, trace fine to medium gravel			-				
3 no -		•	100/6"	NR	+ 001	3.0.B@ 8.5'	85'						
		-											
•											-		
										225			

O' R		i, F.E.				TEST PORTING LOG	REPORT O	F BORI	N6 NO. B.	B-3	SHEET 1	4/3
SECTE	7 10		ombe fil	Sout	н	SNOLER MER: 140 lbs. ALL: 30 mores	enco goil	ATER I	ered ring.	du	water	
B 3	01.	B& B	Drilling Myer Kariv	hen n M.		BORING LOCATION: R.B.	- 3		3013. nded:			
нтеэа	No.	DEPTH	SWPLE BLOWS /6"		/\ •H•	SPAPLE DESCRIPTION	STR	TUN E	BULPHENT NSTALLED		EZUIPHENT INSTALLED	
0'-2'	1	2'	12 -3	0,8'	7	Damp, black Topsoil, tra leaves, roots	ce 0.	2'				
						Loose, damp, light green brown fine to medium (- SAND and SAPROLITE some (-) granite fragmen	5					
21-4	2	4'	13-15	1.2'	28	Medium, damp, light brown fine (-) to medium (+) to coarse (-) SAND and	n					
						SAPROLITE, little (-) fine to medium gravel [granite fragments) trac silt, clay	بد ا					
4'-6'	3	4.5	100/4	0.2'	100 F	very dense, noist, fine is medium GRAVEZ (granit fragments), little fine to						
G'-B'	4	75'	25-47	0.9'	2.00+	green-brown fine to medize S AND and SAPROLITE,	m(+) 7.5	,	·		.	
3'-	5	8.21	40- ^{100/} 2'	0.3'	100+	brown fine to medium						
51 -		اه.٩	100/5"	NR	100+	SAND, little (+) fine to medium gravel [Note: most likely material grave up from granding on bedrock]	nd					
						B 0 8 ©	9.0		à.		276	

RIEN & GERE MEERS, INC. Report of Boring No.: 88-3
Sheet of 2 TEST BORING LOS LOCATION: COMBE FILL SULTI+ SAMPLER Ground Water Depth Date Type: NX BARREL Fall: Date Depth File No.: 3013.012 NJDEP Boring Co.: BAB DRILLING Boring Location: Eround Elevation: Foresan: D. 1988 Geologist: Ended: 614193 Dates: Started: 6/4/90 REZIZOD Field Testing IR Stratus Sample Change Equipment |Penetr/ Death 50 Description General Installed No Depth Recovey Value Descript pH | Cond | HNU | se 8.0 5311 BROWNISH - GREY GRANTE, 88/60 MUDERATELY TO CLOSERY FRACTURED, MODERATULY WED THERED, SUCHTLY ROUGH TO ROUGH SURFACE, FE STAINS THROM GHOUT LENGTA 9.0 OF LORE SOME CLAY SEAMS EVIDENTS IN PRACTURED AREAS 10.0 4.5 11.0 4. 12.0 13.0 END RUNII - 130

* WRING TIME IN MINIFI

IEN & FERE NEERS, INC. Report of Boring No.: 88-3 Sheet 2 of 7 TEST BORING LOS Location: COMBE FILL SOUTH SAMPLER Ground Water Depth Date BARREL Fall: Type: $\wedge \times$ Depth Date CI. File No.: 3013,012 NSDEP B&B Boring Co.: Boring Location: Ground Elevation: Foresan: OBS Seologist: Dates: Started: 6/4/00 Ended 14/193 Field Testing |R Stratus Sample Change Equipment Penetr/ 'N' :Degth Description General Installed lk Jesth RECOVEY Value Cond HAU |se αH Descript 4411 RUN 2 13,0 Rock DESCRIPTION AS ABOVE Removes 1400 9 1020: WA TER PANK 14.0 EMPTY - DEPLACE W/ SPARE SPOG TANK COMPLETE RUN Z A ~17.61 DUG 10 MSUFFICIENT 12 WATER CURING 15,0 Cenus No- continues UNITL FED LACEMEN TANK WAS OBTAINED RIC MOBILIZED 70 BB-17 10.0 · 7,0! 8 EOB 17.01 223

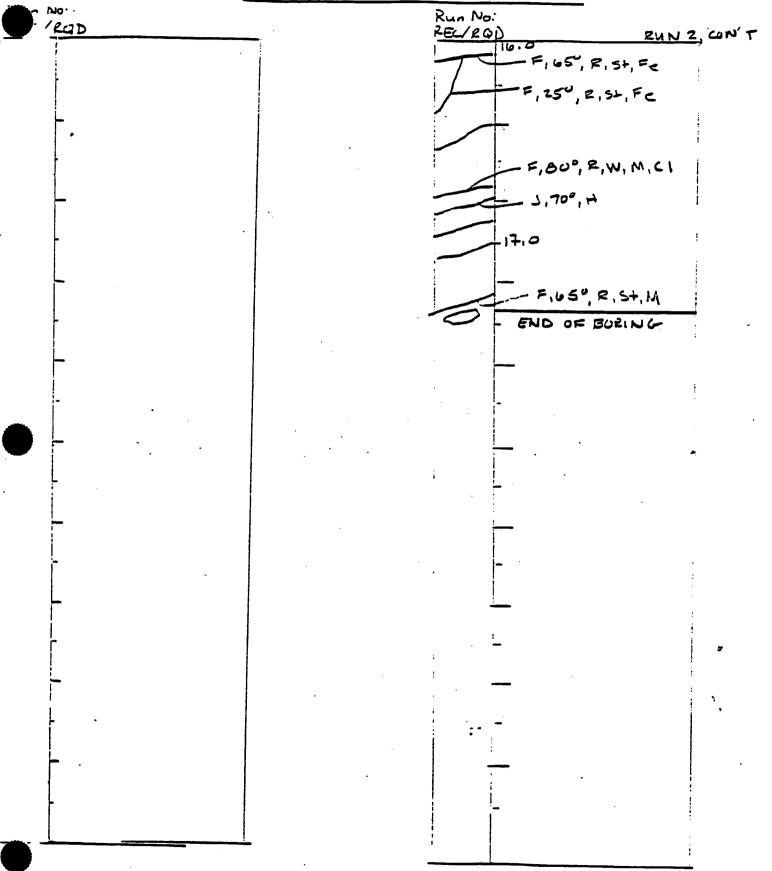
4 CORNO-TIME IN MINIME

UICE >KE ICH File. 3013.01-PROJECT NIDEP Boring BB-3 LOCATION COMBE FILL South No. Run No: /egb ZEL/ROD TOP - PUN 1 120 100 8 10 10 1 53" REL. F,85", R,W, CI 88155 1,60°, H F, 70°, 8, W, Fe F, 900, R, St, Fe, M; 13.0. RUN 2 44 11 226 73/54 = F, 850, R, St, Fe, CI, M F, 700, 2,5+,M CHIPS OF CURE POSSIBLY MISSING - SURPACE VERY WEATHERED F, 80° E, 51, M CORE SEVERELL ERACMBUC 14.0 10.0 - F, ZO", R, W, M F, 85°, 2.W.M F, 40, P, W, M, CI J ,400, 2, FE F. 70°, R. St. 00 15.0 11.0 WEE BENKENBY -3,150, H DEILLING F, 60", R, 34, FE) MAREIAL IS FEI ABLU -. F,604, R,54,C1 F. 60°, 2, 51, FE CABILLY BY F, 30", E, 3+, 50 HA NO F, 50°, R, S+, Fe F, B5", R, W, C1 באוף סד נטונצ 16.0 POSSIBLY INISSING 12,0 Angle of Erachares Junto WITH RESENT TO アダドド ろ Notes. LINGITUDINAL AKIS OF CORE R. ROUGH SULFACE CI - CLAMY SUNA -90° St- Stepoed superice Fe - HEUN - F. S. W. WAVY SHEEREE

M - wire

Boring BB-3

LOCATION CONSE FILL SOUTH



- Crushed 45 microns (mechanical clay) to 0.1 foot.
- If Intensely Fractured 0.05 to 0.1 foot (contains no clay).
- Closely Fractured 0.1 to 0.5 feet.
- MF Moderately Fractured 0.5 to 1.0 foot
- WF Widely Fractured 1.0 to 3.0 feet.
- VF Very Widely Fractured +3 feet.

Descriptors for rock defects should include at least one characteristic from each of the following four parameters:

1. Roughness

- VR Very Rough Near vertical steps and midges occur on the discontinuity
- R Rough Some ridges and side-angle steps are evident; asperities are clearly visible; and discontinuity surface feels very abrasive.
- SR Slightly Rough Asperities on the discontinuity surfaces are distinguishable and can be felt.
- S Smooth Surface appears smooth and feels so to the touch.
- SIK Slickensided Visual evidence of polishing exists.
- 2. Surface Planarity
- W Wavy A moderate undulating surface.
- FL Planar A flat surface.
- ST Stepped A surface with asperities or steps. The height of the asperity should be estimated or measured.
- 3. Surface Coatings and Filling Materials note thickness
- ci clay
- Sd Sand
- G Gypsun
- Ca Calcite
- 'e Iron Oxide
- Clean

LIST OF DESCRIPTORS

Rock Defect Descriptors

1) Surface Roughness

VR Very Rough

R Rough

SR Slighlty Rough

S Smooth

SIX Slickensided

2) Surface Planarity

W Wavy

Pl Planar

St Stepped

3) Filling Materials

Cl Clay

Sd Sand

G Gypsun

Ca Calcite

Fe Iron Oxide

C Clean

4) Type of Discontinuity

B Bedding

H Healed

O Open

T Tight

Flt Fault

Rock Type Descriptors

Hardness -

VH Very Hard

H Harri

MH Moderately Hard

IH Low Hardness

F Friable

S Soft

Core Length

Long Longest

Avg Average

Sht Shortest

Weathering/Alteration

E Extremely Altered

H Highly Altered

M Moderately Altered

S Slighly Altered

U Unaltered

Fracturing

C Crushed (clay) 40.1 ft.

IF Intensely Fractured 0.05 - 0.1 ft.

IF Closey Fractured 0.1 - 0.5 ft.

MF Moderately Fractured 0.5 - 1.0 ft.

WF Widely Fractured 1.0 - 3.0 ft.

VF Very Widely Fractured +3.0 ft.

!		s, FIE.				TEST BORTING LOG	_		ORING NO. B				
		CATION: (iombe F EP	71150	H	STOPLER STOPLER STOPLER STOPLER STOPLER STOPLER STOPLER	en	60011	R No greed de	M	ig soil		
E I Functi OBG H	COL:	: 69 EU06151:	B Drillin Myerch Kariv	ng M.		BORING LOCATION: BB GROUND ELEVATION:	FILE NO.: 3013.012 # 4 3-4 d 5/31/90; ended 5/31/90						
DEPTH	No.	DEPTH	SAMPLE BLOWS /6"	PENETRAL RELEXERY		SAMPLE DESCRIPTION		STRTUM CHANGE DEPTH			ENIPHEN		
0'-2'	1	2'	3-17	1.0'	31	Black Topsoil, trace root and leaves	13	0.3					
						Dense, dry to damp light green-brown SAPROLIT and fine to medium SA little (+) roots, trace silt and clay	<i>الله</i> اء بح			·			
2-4	2	4'	4-11	1.0'	49	Dense, damp light gre to brown fine to medium SAND and SAPROLITE Some (-) fine to medium granel (decomposed granite and granite fro ments.	~ · · · · · · · · · · · · · · · · · · ·						
45-6	き	4.5' 5.5'	100/4"			* Note-sample taken from the of spoon (granite fragments).	m						
5.5 - 6.5		6.5	100/0"	NR	1∞+	B.O.B@6.5		G. 5			.		
		•									23		

<u>a</u> :	JDE	3 DAILN		15	STAPLER TYPE: HAVE: 140 165 b			DORT OF BORING NO. BB-5 SHEET 1/2 LIND WATER No ground water newntered during soil noving. ENO.: 3013.012.#24					
) ROJE	B. d.	3 DAILIN My creh][
No.		Karih	ng Un M. Ke		BORING LOCATION: B & GROUND ELEVATION:	5	30/90; ended 5/30/90						
	DEPTH	SNPLE BLOWS /6"	PENETRN/ RELOWERY	eye VALLE	SAIGLE		STRTUM CHANGE DEPTH			ENIPHENT INSTRUCED	R K S		
1	2'	1-3	1.1	4	Black topsoil, trace root: leaves	5,	0.1				Ť		
_					Very loose, must, light b	June					T		
						رد۸							
2	3.7'	9-13	1.1'	36	·	_					ľ		
1		23- log-		•	brown fine to medium	- 1							
				·	trace (+) fine gravel	1							
+					(granite fragments), tro	عد			-	; ; ;			
1	÷				(-) s. It, clay					- 1			
	4.1	100/1"	NR	100+		.							
	4.8'	·			Rods Bouncing B. O. B. @ 4.8'								
1							48	····			_		
		·											
-					·	j					!		
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丰													
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		2 3.7' 4.1 4.8'	2 3.7' 9-13 23-100/3	2 3.7' 9-13 1.1' 23-100/3' 4.1 120/1" NR	2 3.7' 9-13 1.1' 36 23-100/3" 36 4.1 \(\pi\)2" NR \(\pi\)	Very loose, muist, light be fine (+) to medium SA trace silt, clay, roots 2 3.7' 9-13 1.1' 36 Dense, clamp light gree brown fine to medium SAND and SAPROLITE, trace (+) fine gravel (granife fragments), trace (-) silt, clay	Very loose, must, light brown fine (+) to medium SAND, trace silt, clay, roots 2 3.7' 9-13 1.1' 36 Dense, damp light green, brown fine to medium SAND and SAPROLITE, trace (+) fine gravel (granife fragments), trace (-) silt, clay 4.1 100/1" NR 100+ Rods Bouncing	Very loose, moist, light brown fine (+) to medium SAND, trace silt, clay, roots 2 3.7' 9-13 1.1' 36 Dense, clamp light green, brown fine to medium SAND and SAPROLITE, trace (+) fine gravel (granife fragments), trace (-) silt, clay 4.1 100/1" NR 100+ Rods Bouncing	Very loose, nurst, light brown fine (t) to medium SAND trace silt, clay, roots 2 3.7' 9-13 1.1' 36 Dense, clamp light green, brown fine to medium SAND and SAPPOLITE, trace (t) fine gravel (granife fragments), trace (-) silt, clay 4.1 100/1" NR 100+ Rods Bouncing	Very loose, must, light brown fine (+) to medium SAND trace silt, clay, roots 2 3.7' 9-13 1.1' 36 Dense, damp light green, brown fine to medium SAND and SAPPOLITE, trace (+) fine gravel (granile fragments), trace (-) silt, clay 4.1 129/1" NR 100† Rods Bouncing B. O. B. @ 4.8' 48'	Very loose, noist light brown fine (+) to medium SAND trace silt, clay, roots 2 3.7' 9-13 1.1' 36 Dense, damp light green, brown fine to medium SAND and SAPPOLITE, trace (+) fine gravel (granik frag ments), trace (-) silt, clay 4.1 10/1" NR 1001 Rods Bouncing B.O.B. @ +.8' 48'		

L		i, Fie				TEST RORING LOG					SHEET \$	
MI: NJDEP					H	SAMPLER YPE: PROMER: 140 lbs. PLL: 30 inches:	encountered during soil boring FILE NO.: 3013.012					
P & COL: B & B Drilling FULLAN: Doug Mylerchen CDS HYDROGEDLOSIST: Kann M. Kohl						BORING LOCATION: BB GROUND ELEVATION: DATES: Stacked 5		29/90				
DEPTH	No.	DEPTH	SNPLE BLOWS /6°	PENETRIV REDDVERY	. WILLE	SAMPLE DESCRIPTION	STR	TUM			EZUIPHENT INSTRULED	RX
0'-2'	1	2'	4-5	0.4	12	Moist, black TOPSOIL	1.	6			1	\dagger
			7-10			Medium dense, moist,					·	\top
			-			orange brown SAND						
						little fine to medium						
	·					gravel, little silt, trace						
2'-4'	2	4'	9-10	1.0'		clay						
			40-70	2.0	30	Very dense, moist, fine +						
			10 .0		÷	medium SAND and SAPE	المتكا		!			
						trace silt, trace clay.	1					
4	٦	s'	50-10%	1.0'	100+	as above						
6-8			100/0"	NR	100°	refusal						
						8.0.806	6	.				
	_											
_		·			<u> </u>		- 1		-		•	
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O' B	RIEN	s, Fig.				TEST RORING LOG REP	ORT OF E	ORING NO. BI	3-66	SEET 1	1/5	
PROJECT LOCATION: Combe fill South						FILE NO. 30 Mches FROM WATER No ground water encountered during soil boring FILE NO.: 3013.012,						
BY 3 COL: B& B Driling FULLAN: Dag Myerzhan CDB HYDROSECLOSIST: Karın M. Kohl						BORING LOCATION: BB-6A GROUND ELEVATION: DATES: Started: 5/29/90; Ended: 5/29/90						
DEPTH	No.	DEPTH	SNPLE BLOWS /6°	PENETRAL/ RECOVERY		SOMPLE DESCRIPTION	STRTUM	EMINEU		ENIPHENT INSTRLLED	IX I	
S'-2	7	.21	4-4	-	9	Dark brown TOPSOIL	DEPTH				Sŧ	
			5-6			Loose, damp, brown-orange						
						Fine to medium SAND, trace	.]					
						Sitt, clay						
'بــ'2			9-100/4	NR	100	·						
				•				:				
4-6	2	6'		1-0'	100	Very dense, damp, light						
			57-31			brown, orange fine to						
						medium SAND, come						
						green. Saprolite traceclay sit, noots	6'			,		
		•					6		ľ		H	
<u>6'-β'</u>	3	৪ '	7-21	4.01	64		K					
			<u>43-l∞</u>			SAPROLITE and fine to						
						medium SAND						
g'a'			ا مرصد	NR		Refusal						
						Refusal						
1-105	-		100/0"	NR		Letusai						
1 5][_	100/0"	NR		Refusal						
		·				B. O. B. @ 11				•		
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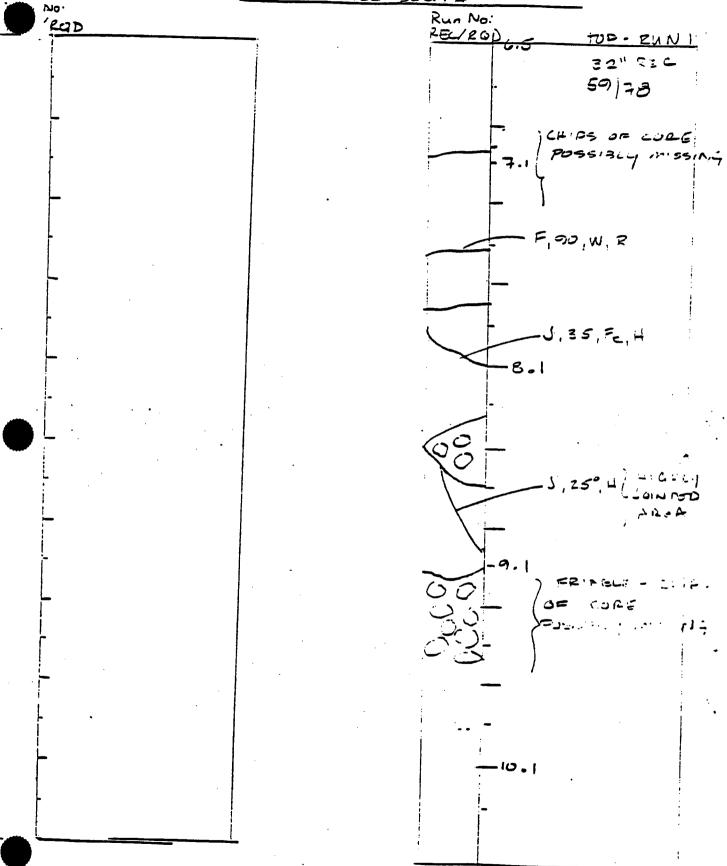
P. BRIEDS, SIRE						TEST BORING LOG	EPORT OF BORING NO. $BB-7$ SHEET $1/2$							
W. BADEB						PRE: 140 (bs.	encountered during soil boring. THE NO.: 3013.012.							
I ECL: Bt, B Drilling Fu. AN: Doug Myerchen OBS HYDROGETLOSIST: Karin M. Koh						BORING LOCATION: BB-	·7	-4/90; ended 5/29/90						
SWPLE										l p				
DEPTH	No.	DEPTH	BLOWS /6"	PELETRAL RECOVERY	AMTTE	SAMPLE DESCRIPTION	STRTUM CHANGE DEPTH			ENTRILED	X X			
0·2	1	2'	1-1	0,7'	4	Very loose, damp, black, box	un				†			
			3-5	<u> </u>		I very loose, damp, black, boil fine to medium SAND,								
						I some silt, trace clay, tra	رف							
						gravel trace roots	2.0							
						very dense, moist orange					Τ			
z <u>'-+</u>	2	41	11-25	1.5	65	brown, SAPROLITE, little					1			
			40-73			medium to coarse gravel,	-							
		·				I trace clay								
					•	'								
														
	3	6'	39 - 44	1.5	100+	Very dense, moist light								
	\dashv		57-63			Very dense, moist light greenish brown SAND and SAPROLITE, trace gravel.			- 1					
						and SAPROLITE track				İ				
						gravel.								
	$\frac{1}{\sqrt{2}}$	£ -1				i								
0.85	4-1	6.5	100 /5"	NE	100		1 1			İ				
	-					of 5" retained in Spoon (likely cutting debris).	1 1							
						sample consist of sapolite and decomposed			.					
						and decomposed			İ					
	+					granik,				•				
	\dashv					P 0 B G 6.5'				į				
	+					P 0 B . G . S		1		. [
+	\dashv										-			
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-	-							1	4	237				
+	+									.				
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IEN & JERE VEERS, INC. Report of Boring No.: 88-7 TEST BORING LOS Sheet , of , Location: Combe FILL Sound SAMPLER Ground Water Depth Date Type: MX BARRET Depth Hasser: File No.: NSDEP 3013,012 Boring Co.: B&B Boring Location: Ground Elevation: DBS Seologist: Dates: Started:614100 Ended: 4 15 19 10 (والمالية Stratua Field Testing |R Sample Change Equipment |Penetr/ Depth Description Seneral Installed Se RECOVEY Death Yalue No Cond HNU |se Descript рH 32" 6.5 GREY-GREEN GRANITE 59/78 SAPROYTE MUDERATERY HARD, SUCHTEY WEATHERED MUDERATELY ERACTURED, ROUGH to SCICHTZY ROUGH SURFACE, CLAY SEAMING Fe sming meaning HOLE IS USING GRAY-BLACK FINE -LARGE QUANTITES MEDIUM GRAINED OF WATER SINCE GRAMIE - MODERATERY BENTONITE SIGHLDA HARD , MODERATELY 10 AUGER CHSING HIGHLY ERACURED, CONTINUES POLETAK CLAY SEAM (?) FE SMIMNG, FRIABLE, م حصون 10 SWIRHED TO RESCRIE HICHLY WODSHURED 10,5 WATER! MANK AT END OF BURING-10.5' 9.51 OUT OF WATER-ENDED BURING NOTE: HOLE GROWTED ON 6-5-90 243

1 1 PING TIME IN MINIST

NIDEP

LOCATION COMBE EILL Sou TH



Notes: As PRIMOUS PAGE

ATTACHMENT C

SETTLEMENT CALCULATIONS



ombe Fill South Land Fill 1/5 KMK 6/22/90 3013.012.327
S ETTLEMENT ANALYSES
Reference: Transmission Line Structure Foundations for Uplift-Compression
A. CIRCULAR TANKS Loading
assume: diameter: 32 ft (corresponds to maximum
tank diameter)
00 = 1000 psf (as per AJS)
toundation is rigid
$\frac{Po = \Delta \sigma (1 - \nu^2) r I_p for circular foundations}$
· E
where:
Pe=elasti surface settlement.
2) = Poisson's ratio
r = foundation radius
E= elastic modulus
$I_p = \sqrt{\pi}$
B ₂
B = = shape and rigidity factor
8. 241



Combe Fill Sath Landfill 2/5 KMK 6/22/90 LOB NO	\neg
•	
Assume!	
2 = Poisson's ratio = 0.35	F-1
for dense sand drained loading	
E= 10,000 psi · 144 in2/ = 1.44 × 106 psf	
	·
BZ= 1.13 for rigid, circular foundations	
$\frac{1}{\beta_{2}} = \sqrt{\pi} = \sqrt{\pi} = 1.57$	
$Pe = \Delta \sigma (1-\nu^2) r \text{Ip} = 1000, s(1-(0.35)^2) (16f+) (1.57) s(1-(0.35)^2) s(1-(0.35$	<u> </u>
1.44×106 psf	
Pe = 0.015 ft = 0.18 inches	
	· · · · · · · · · · · · · · · · · · ·
Pe=0.2 inches (at center)	
· •	
pedos = 0.64 prenter for circular loads	
· pedge = a 64 (0.2)= 0.13 mches	
. 0	
P differential = 0.07 inches 248	

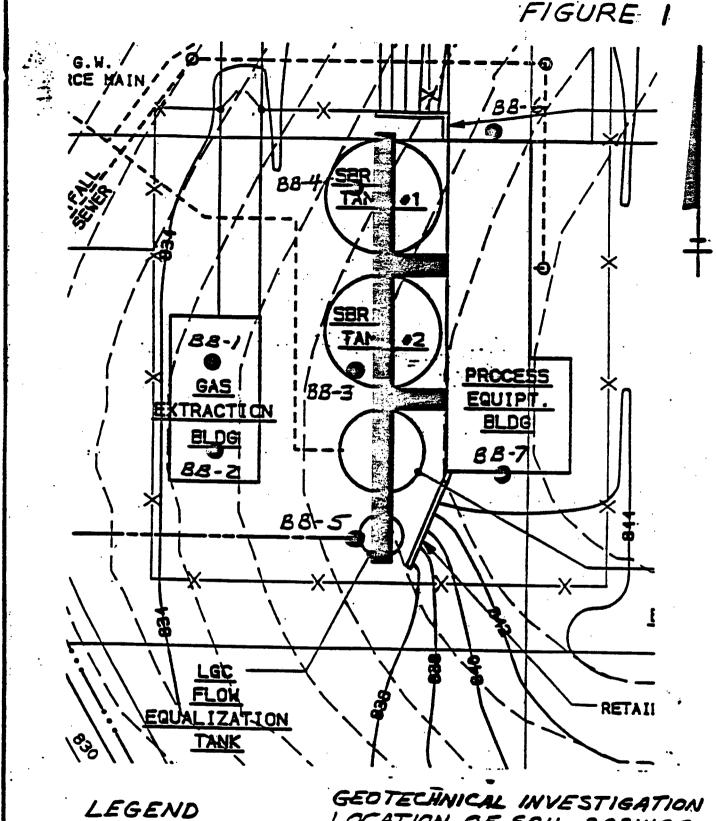
onbe Fill South Landfill 3/5 1CMK 6/22/90 30 13.012.327
B. GAS EXTRACTION BUILDING
De- △O(1-V²) BIp where Ip= √7B
E 32
for rectangular foundations
where:
Po = elastic surface settlement
Do applied compressive stress
2 : Poisson's ratio
B= forndation width
L= foundation length
Bz=shape and rigidity factor
E= elastic modulus
Assume: 27=0.35
$E = 10,000 \text{ psi} = 1.44 \times 10^6 \text{ psf}$
L= 65 ft
$B = 35 ff \Rightarrow 1.8c$ $B_{2} = 1.08$
$I_p = VVB = V1.86 - 1.26$



Combe Fill Soth Landfill 4/5 1cm	DATE JOB NO. LK 6/22/90 301 3,012.327
•	
Pe = Δ5 (1-υ2) B Tp = 250 (1-(0.	35)2)(35)(1.26)
<u> </u>	4×10% psf
pe = 0.007 ft = 0.08 inches at	center line
pedge = 0.85 pec for low. UB	
	<u>.c</u>
: P differential = 0.01 inches	•
	*· 244 ·
	•



Combe Fil South Landfil 5/5 KMK 6/22/90/3013.012.327
C PROVIES ST. CHIEF BLUE
C. PROLESS EQUIPMENT BUILDING
Assume: Do = 250 psf
E=10,000 psi=1.44×106 psf
<u>L=130'</u>
B= 45' (conservative) => 4B= 2.89
BZ=1.15
Ip= \4B/B= \2.89/1.15= 1.48
Pe = DO (1-v2) BIp where Ip= V7B
BZ
$Pe = (250)(1-(0.35)^2)(45)(1.48)$
1.44×106
pe=0.01 ft=0,12 indes @ center
PRE (1.01 AT 0,12 INDES (2)) CENTER
,
Ondar = 0.500 245
Pedge= 0.5 Pec . 245
Pedge = 0.50 (0.12) = 0.06 menes
: Pdifferential = 0,06
: Pdifferensial = 0,06



88-2 ● BORING LOCATION OF SOIL BORINGS

COMBE FILL SOUTH LANDFILL SUPERFUND SITE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

SCALE : 1 - 40'

JUNE 1990

246

VI. Aquifer Performance Test

The graphs and calculations used to develop this summary is provided in Attachment 7.

The average T value for this location was 790 gpd/ft. The average K value, using a saturated thickness of 12 feet, is 66 gpd/ft². The values of T calculated for each well using each method are quite similar and range from 427 to 1,150 gpd/ft. Refusal was met in the pumping well at approximately 40 feet and in the observation wells at approximately 60 feet. If a range of "b" is used (12 to 30 feet) a range of K is obtained of 26 to 66 gpd/ft². These values are typical for the material encountered. An average value of K of 46 gpd/ft² would be representative of this location.

The range of average storage values for this location is 0.006 to 0.05. The distance-drawdown storage value is 0.003. The values obtained for PT-2 and PTO-4 using the Type Curve Delayed Method, 0.12 and 0.02, respectively, are more representative of actual values expected. The lower range of values suggest elastic conditions.

The bedrock monitoring well (D-9) showed no measurable decrease in water level for the duration of this pump test. This is most likely due to its distance from the pumping well (37 ft). No drawdown was recorded in S-3, an overburden well 55 feet from the pumping well, therefore, it would not be expected to see drawdown in the bedrock well 37 feet away.

PUMP TEST #3

Pump test #3 was performed from December 12 through 15, 1988 and utilized wells: PT-3; PTO-5; PTO-6; S-1 and D-7. A general geologic cross-section is provided as Figure 4. An average discharge rate of 0.5 gpm was set at the wellhead and monitored for the initiation of the test from the discharge point at the top of the landfill. The well number, corresponding data logger channel, and pressure transducer sensitivity are as follows:

Well No.	Radius (ft)	Channel No.	Transducer (psi)
PT-3	0.3	Ch1	25
PTO-5	5	Ch2 & Ch3	5 & 15
PTO-6	10	Ch4 & Ch5	5 & 1 ` 5
S-1	15	Ch6 & Ch8	5 & 5 (
D-7	45	Ch7 & Ch	15

The data logger was set to record measurements at the following times and intervals:

Date	Time (hours)	Recording Interval
12/12/88	1514-1519	1 Reading/Second
	1515	Pump Start
	1519-1529	1 Reading/30 Second
	1529-1550	1 Reading/Minute
	1550-1640	1 Reading/5 Minutes
	1640-1800	1 Reading/15 Minutes
	1800-2100	1 Reading/30 Minutes
12/14/88	2100	1 Reading/60 Minutes
	1530-1545	1 Reading/Minute
	1545-1548	1 Reading/Second
	1546	Pump Off (Recovery)
	1548-1557	1 Reading/30 Seconds
	1557-1620	1 Reading/Minute
	1620-1710	1 Reading/5 Minutes
	1710-0810	1 Reading/15 Minutes
12/15/88	0810	1 Reading/60 Minutes
10, 10, 00	1210	End Test

During the performance of this test the discharge line was found to be freezing possibly causing variations in the pumping rate. This was possible due to the low pumping rate (0.5 gpm), the distance to the discharge location and the severe cold weather conditions. The discharge hose was removed and the ground water was directed to the ground surface away from the pumping well. Water was channeled away from the pumping area and froze at the surface shortly after discharge. Water flow rates were then monitored from the new discharge location.

The transmissivity and specific yield values calculated for this pump test have been summarized and are provided below:

Pump Test #3 Data Summary

Q = 0.5 gpm b = 11 ft (PT-3)

Transmissivity (gpd/ft):

Well No.	Type Curve Elastic-Delayed	Jacob ·	Recovery	Average Value
PT-3	83-107	259	69	130
PTO-5	791-689	357	1650	872
PTO-6	828-996	275	1320	85 5
S-1	755-1070	377	943	786
				A
			Average	660

Distance-Drawdown (Range)

154 to 182

Storage (S):

	Type Curve Elastic-Delayed	Jacob (Elastic)		Average Value Elastic-Delayed
PT-3 PTO-5 PTO-6 S-1	0.008-0.27 0.04-(1.4)* 0.006-0.14 0.002-0.02	1.5 0.34 0.28		0.008-0.27 0.77-(1.4)* 0.17-0.14 0.14-0.02
			Average	0.27-0.11
		Distance-Drawdown	(Range)	0.22 to 1.3

Note: * Data point (1.4) was not used to calculate average values.

The graphs and calculations used to develop this summary are provided in Attachment 8.

The average value of T for this location was 660 gpd/ft. The average value of K, using a saturated thickness of 11 feet, is 60 gpd/ft². The range in T was from 69 to 1,650 gpd/ft. The material encountered at this location was typically very fine grained. The low discharge rate of 0.5 gpm is indicative of a low permeability aquifer. This low pumping rate increases the amount of time required to dewater the pumping well. It is expected that the freezing discharge lines and the low pumping rate are reasons for the variable drawdown curves. In addition, the fine grain material also extends the amount of time required where delayed drainage is no longer affecting water levels. The high T values at this location most likely reflect influence from delayed drainage. The bedrock at this location appears to undulate slightly (see boring logs and Figure 3). If the overburden aquifer thickness increased due to these undulations, the values of T in the observation wells may reflect this as greater recharge to the observation well resulting in values of T higher than the pumping well.

The cross-section and boring logs for this location reveal a range of aquifer thickness. This range of $\tilde{\mathbf{b}}$ will play a significant role in the overall range of T. If an average aquifer thickness of 16 feet is utilized an average value of T of 41 gpd/ft² results.

The range of average storage values for this location is 0.27 to 0.11. The distance-drawdown storage values range from 0.22 to 1.3. The high values reflect the effects of delayed drainage and are not considered typical for the material encountered.

The bedrock monitoring well (D-7) revealed approximately 0.25 feet of the total drawdown. This drawdown was slight and gradual for the duration of the pump test, indicative of communication between the two aquifers at this location.

PUMP TEST #4

Pump test #4 was performed from December 19 through 22, 1988 and utilized wells: PT-4; PTO-7; PTO-8; S-5 and D-4. A general geologic cross-section is included as Figure 5. An average discharge rate of 11.1 gpm was set at the wellhead and monitored hourly at the discharge point at the top of the landfill. The well number, corresponding data logger channel, and pressure transducer sensitivity are as follows:

Well No.	Radius (ft)	Channel No.	Transducer (psi)
PT-4	0.3	Ch1	25
PTO-7	5	Ch4 & Ch5	15 & 5
PTO-8	10	Ch2 & Ch3	5 & 15
S-5	40	Ch6 & Ch7	5 & 15
D-4	15	Ch8	5

The data logger was set to record measurements at the following times and intervals:

Date	Time (Hours)	Recording Interval
12/19/88	1730-1732	1 Reading/Second
	1731	Pump Start
	1732-1742	1 Reading/30 Seconds
	1742-1805	1 Reading/Minute
	1805-1900	1 Reading/5 Minutes
	1900-2000	1 Reading/15 Minutes
	2000-2105	1 Reading/30 Minutes
	2105	1 Reading/60 Minutes
12/21/88	1715-1730	1 Reading/Minute
,,	1730-1732	1 Reading/Second
	1731	Pump Off (Recovery)
	1732-1742	1 Reading/30 Seconds
	1742-1830	1 Reading/Minute
	1830-2015	1 Reading/15 Minutes
	2015-0935	1 Reading/30 Minutes
10/00/00		
12/22/88	0935	1 Reading/60 Minutes
	0735	End Test

During this pump test the subcontractor was found to be guestimating discharge rates and not actually measuring the rate at the discharge location. This was documented by both the NJDEP and O'Brien & Gere on-site inspectors. The subcontractors office was notified and the problem was corrected.

The transmissivity and specific yield values calculated for this pump test have been summarized and are provided below:

Pump Test #4 Data Summary

Q = 11.1 gpm b = 27 ft (PT-4)

Transmissivity (gpd/ft): Rounded to nearest whole number

Well No.	Type Curve Elastic-Delayed	Jacob	Recovery	Average Value
PT-4	965-965	842	2 093	1216
PTO-7	1530-1270	2171	2171	1786
PTO-8	1110-2160	3256	3907	2608
S-5	1920-1800	2505	. 2170	2098
			Average	1927
÷			Distance-Drawdown	2363

Storage (S):

	Type Curve Elastic-Delayed	Jacob (Elastic)	Average Value Elastic-Delayed
PT-4	0.07-(2.3)	-	0.07 - (2.3)
PTO-7	0.01-0.26	0.005	0.007-0.26
PTO-8	0.009-0.05	0.003	0.006-0.05
S-5	0.0007-0.003	0.0005	0.0006-0.003
		Average	0.02-0.10
		Distance-Drawdown	0.004

Note: * Data point (2.3) was not used to calculate average values.

The graphs and calculations used to develop this summary are provided in Attachment 9.

The average T at this location was 1927 gpd/ft. The average K value, using a saturated thickness of 27 feet, is 71 gpd/ft². The values of T range from 842 to 3900 gpd/ft. The drawdown data indicates that well S-5 recorded a larger water level decrease than well PTO-8. Well PTO-8 is 30 feet closer than S-5 to the pumping well. The reason this occurs may be due to the fact that S-5 screens only the lower ten (10) feet of the aquifer. The aquifer in this location is comprised of approximately ten (10) feet of silty sand and clay overlying approximately ten (10) feet of a coarser weathered granite (saprolite). Well PTO-8 screens the entire length of the aquifer. The upper ten (10) feet of aquifer may act as a recharge in well PTO-8 as the lower coarser material produces more water. This results in an average water level in PTO-8 which is higher than well S-5. This in turn results in a higher average T for PTO-8.

A review of T values for this location shows the values increasing as the distance from the pumping well increases. As the aquifer is relatively uniform in thickness, the higher values of T calculated may actually reflect delayed drainage. The early type curve data may be more representative of the aquifer in this area.

The range of average storage values for this location is 0.02 to 0.10. The high end values obtained at this location reflect the effects of delayed drainage and are higher than would be expected for the material encountered.

The water level in bedrock monitoring well D-4 decreased approximately 1.75 feet over the duration of this pumping program. This decrease began approximately ten (10) minutes following the initiation of pumping, indicating that communication between the two (2) aquifers does exist at this location.

DATA REVIEW

The data from this program reveal values of T and S to range at each location. A significant range may be a result of delayed drainage. Average values per location are summarized below:

Location	T (gpd/ft)	Storage Elastic-Delayed	K (gpd/ft ²)
Pump Test #1	1,011	0.008-0.12	27
Pump Test #2	790	0.006-0.05	45
Pump Test #3	660	0.27-0.46	41
Pump Test #4	1875	0.02-0.65	
Site Average:	1084	0.08-0.32	46

As seen above the average range of K sitewide is 27 to 71 gpd/ft². The values of K and S for Pump Test areas 1, 2, and 3 were expected to be low based on the relatively fine grained material and aquifer thickness encountered. The higher values at Pump Test area 4 are most likely attributable to the coarser grained saprolite layer producing more water than the other locations.

The overburden and bedrock aquifers are apparently in communication in this area. The data obtained indicates a communication is in effect due to the decline of water levels in the bedrock wells during the pumping program.

A suggested range of K and S for this facility is:

 $K = 25 \text{ to } 75 \text{ gpd/ft}^2$

S = 0.10 to 0.30 gpd/ft

As discussed by Freeze and Cherry (Groundwater, 1979; p. 61) the storage values for an unconfined aquifer typically range from 0.01 to 0.30. Referencing typical values of K (Groundwater, 1979; p.29) for the material encountered at the landfill a range of 1 to 100 gpd/ft² would not be uncommon.

Utilizing the range of T and S values obtained from this program would result in a conservation basis for design.

/kap

List of Attachments:

Table 1 - Water Level Data

Figure 1 - Site Plan

- 2 Geologic Cross Section Pump Test #1
- 3 Geologic Cross Section Pump Test #2
- 4 Geologic Cross Section Pump Test #3
- 5 Geologic Cross Section Pump Test #4

Attachment 1 - Boring Logs

- 2 Enviro-Labs System Raw Data
- 3 Neuman: Aquifer Test Analysis
- 4 Graphical Well Analysis Package Description
- 5 GWAP Raw Data
- 6 Pump Test #1 Data
- 7 Pump Test #2 Data
- 8 Pump Test #3 Data
- 9 Pump Test #4 Data

List of References:

Driscoll, F.G., Groundwater and Wells, 1986.

Boulton, N.S., Proc. Inst. Eng., 26, 469, 1963.

Freeze, R.A./Cherry, J.A., Groundwater, 1976

Pricket, T.A., Type-Curve Solution to Aquifer Tests Under Water Table Conditions, Ground Water, 3(3), 5, 1965.

Todd, D.K., Groundwater Hydrology, 1980.

COMBE FILL SOUTH LANDFILL Water Levels

	Csg.	DATE:					_			
Well #	Hieght	8-8-88	10-27-88	10-28-88		11-29-88		12-12-88	12-19-88	
PT-1	2.621		10.82		10.93		8.31			9.35
PTQ-1	2.43'		10.75'		10.97'		8.81			9.22
PT0-2	2.67'		10.71		10.88		8.62'			9.131
PT-2	2.35		26.31	26.351	26.41	23.11				24.57'
PTO-3	2.25'		26.21	26.151	26.421	22.93'				24.41
PTO-4	2.3		26.71	26.61	26.71	23.3				24.7'
PT-3	2.55'		•	9.15	6.81			5.85'		6.451
PTO-5	2.28			8.65'	6.52'			4.621		4.941
PTO-6	2.55			7.651	5.35'			5.251		5.57'
PT-4	3.25			8.15	4.931				4.11	3.481
PTO-7	3.18'			8.21	5.041				4.121	3.55
PTO-8	3.28	•		8.65	5.351				4.321	3.681
D-8	2.05			-	10.91		9.681			9.371
5-4	2.21	10.01			11.75		9.25			9.871
0-9	1.941				26.51	22.911				24.451
Š-3	2.341	22.75			24.01'	20.24				22.461
0-7	1.63				6.17			3.77'		4.091
S-1	2.41	5.01			4.91			2.91		3.36
D-4	1.521				6.78				5.88	5.281
S-5	2.761	7.211			6.141				5.021	4.41
S-2	1.8	18.131			•••					17.71
SB-3	2.47	15.5								18.931
SB-4	2.25	3.8								2.25
SW-2		3.0								
S-6	2.631	23.55								23.441
58-2	1.45	17.39								
0-6										64.161

418

COMBE FILL SOUTH LANDFILL WELL LOCATION SURVEY

TABLE OF GROUNDWATER MONITORING WELLS

WELL NO.	THT NO.	NORTHING (y)	EASTING (x)	GROUND ELEV.	RIM ELEV.
SB-1	230	706721 - 4940	1979780.6067	848 • 1	850.60
SB-2	222	705531 - 5157	1980246 - 9056	811-4	813-11*
SB-3	173	704997+0022	1979280 - 3309	811-6	813.98
SB-4	184	705298 • 7307	1978260 • 9475	791 - 9	794.48
D-1	196	707257 - 2881	.1979172-6394	835.7	338.02
0-2	223	707415-1316	1981016-1822	793.6	. 794.50
0-3	212	704973-9952	1980711.4514	824.6	326.34
0-4	195	706561 - 4853	1978421 - 0237	302.2	804-01*
D-5	229	706664-1423	1979874.4507	841.9	343.36
D-6	239	705973-5620	1979036-1415	368.0	872.55
D-7	189	705204 - 0367	1978263.5510	791-3	792.97
D-8	150	705771 - 7951	1979901.7870	308-5	810-42
D-9	179	704694 - 1809	1979088.9954	806-8	308-80
S-1	188	705247 - 8626	1978254-5994	791-6	793.99
S-2	225	706271 - 5751	1980532.7633	815.9	817.96
S-3	175	704759 - 3203	1979142.2377	807.0	809.53*
S-4	108	705711-9302	1979855.8155	808.3	810-76*
S-5	191	706585-3415	1978475.3445	802.3	805-19*
S-6	197	707220 - 4754	1979216-5575	837.6	840.68
SW-2	170	705174-2810	1979583 - 3235	797-1	799 - 23
SW-4	190	705170 - 2052	1978167 . 5920	783-5	785.68
DH-2	200	705363 - 1651	1980893.9580	844 - 1	845-21
DW-4	224	706212-5849	1980659 6489	818-4	819.89
		.i	. ii	·	· ·

TABLE OF PUMP TEST WELLS

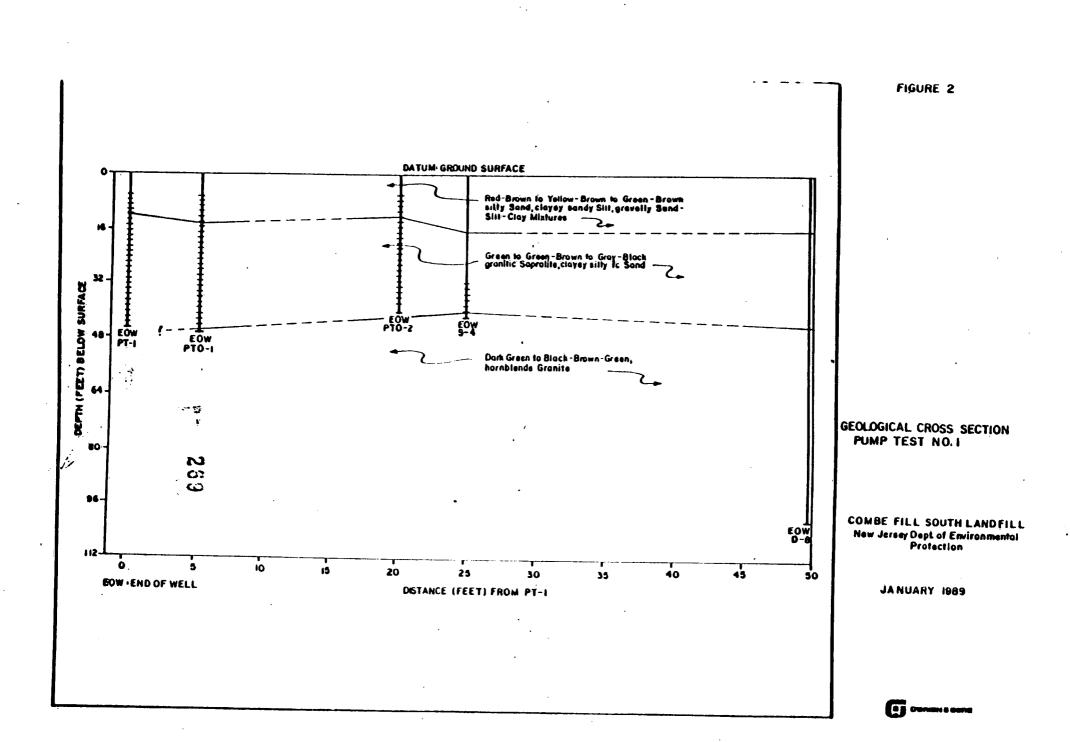
ELL NO.	; TWT NO+ :	NORTHING (y)	EASTING (x)	GROUND ELEV.	RIM ELEV.
PT-1	149	705751 - 8383	1979886 - 4489	308-1	810.64
PTO-1	109	705748-0527	1979882-3350	308-1	810-47
PTO-2	151	705739.7821	1979902-5261	307-8	810.34
PT-2	177	704711-9146	1979121-0845	306.7	809.02
PT0-3	176	704716.5853	1979125-8497	306 - 7	808.80
PTO-4	178	704703 - 4843	1979127-1855	306.5	808.73
PT-3	136	705252 - 2300	1978278-3972	794.5	796 - 86
PTO-5	185	705257-0234	1978276-8323	793-1	795.63
PT0-6	187	705251 - 0086	1978268 - 6041	794.3	796.50
PT-4	193	706563.3002	1978435-6509	301.4	804-64
PTO-7	192	706564 - 9461	1978440-1136	301.5	804.65
PT0-8	194	706571 - 4767	1978428-8752	301.5	804.69

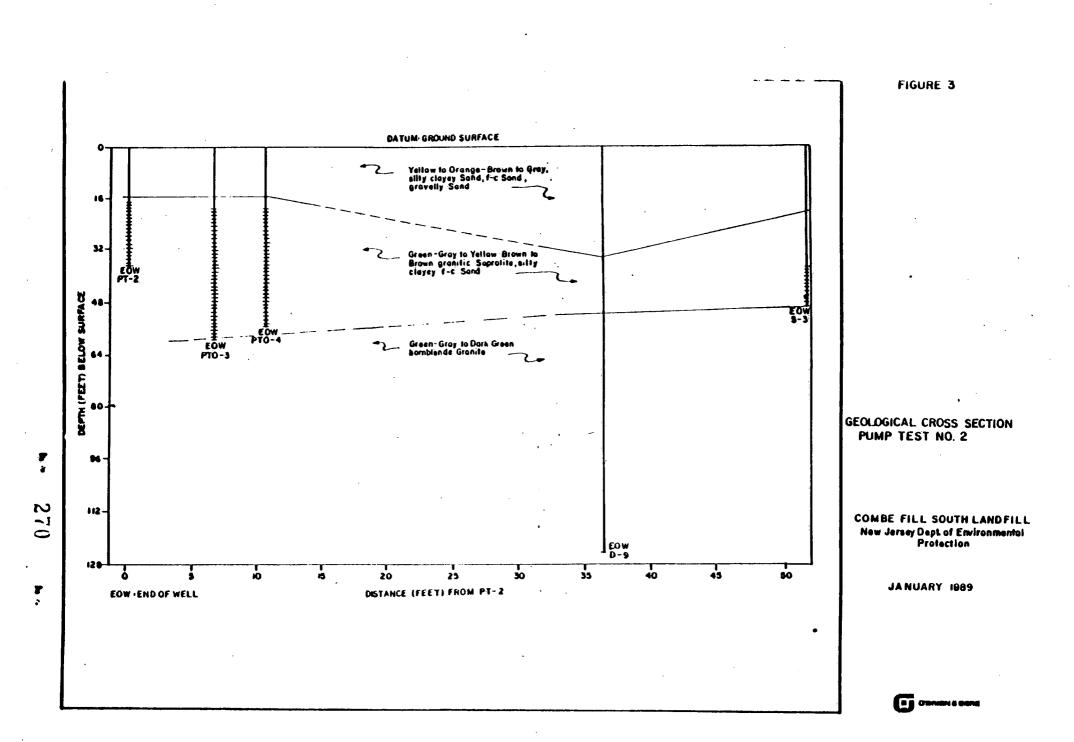
TABLE OF GAS TEST WELLS

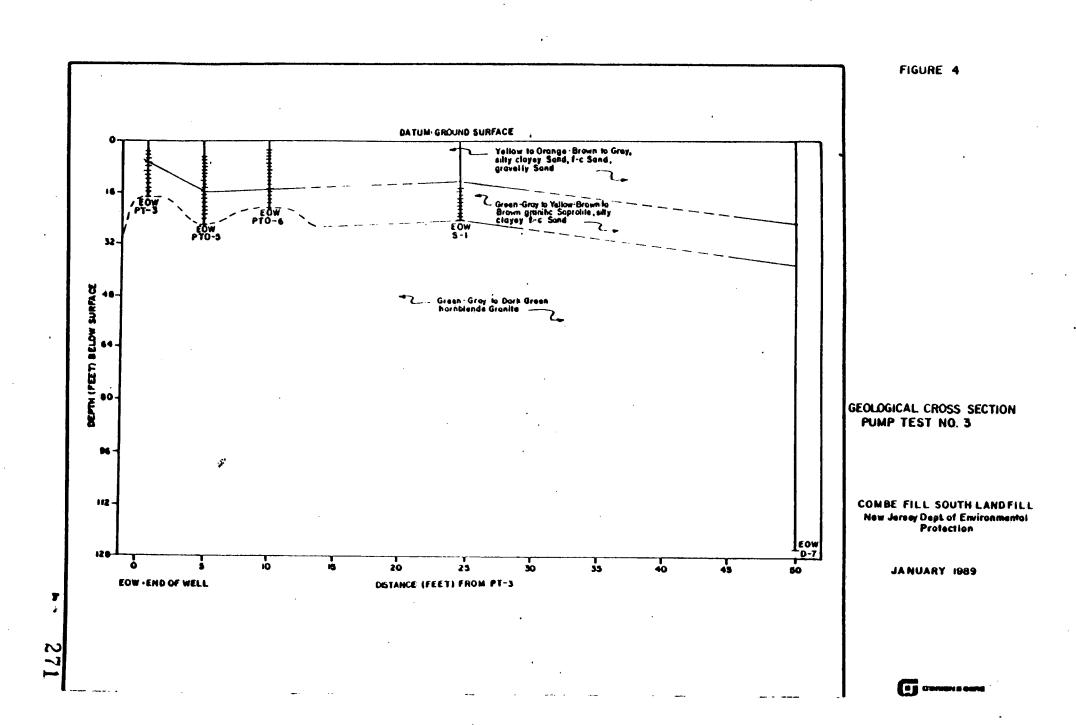
ELL NO.	TWT NO.	NORTHING (y)	: EASTING (x)	GROUND ELEV.	RIM ELEV.
GT-1	241	705469+1660	1979105.3083	859.0	862.1+
GT-2	238	706215.0684	1979491.0902	367.0	870.37

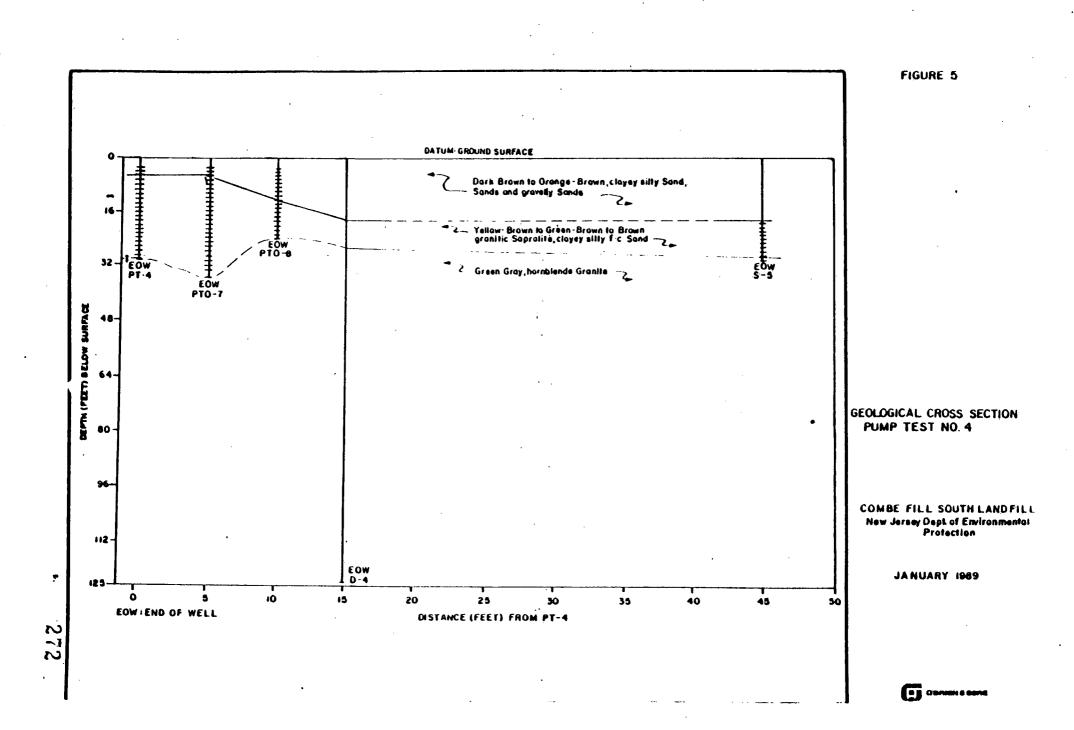
* = ELEVATION TAKEN ON LID (CASING COULD NOT BE OPENED). LID THICKNESS APPROX. 0.01' THICK.











ATTACHMENT 1 Boring Logs

FRIEN & SERE Report of Boring Mo.: FT-1 Sheet (of) TEST SORING LOS Froject Location: Washington Two. 3485 59 Ground Water Jesta Date Date 'Type:E'split spor 'Hasmer:1+0 pound New Jarsey (Client: N.J.O.E.F. Compe Fill South Fall: 30* Boring CollEagine Soils Foreman Rick Eagsin 1988 Seclogist: John Know Soring Cocation: See site blan Bround Elevation: --Dates: Starteg:09/85/86 Ended: 05/25/55 Stratus Field Testing 15 ! Sample Change Seneral Sassie Equipment Installed 3lows Depth ! Penstr/ Sescription 'Mo! Depth ! Resoury Value 12507121 of | Cond [HAU [sal Medius dense, red-prown salby Band or, granate gravel, gray green too of saponolise. 1:0-10.75 10-12 13.9 12:.75 CEMEN 3 :0.5 DENTONTE Medica dense chark of secondline on our of spoon, no receivery. 王约 33 12,10 Auger refusal at +5'. Screen from 45'-s . ſ 74 ----

C'SRI	EN 1 GERE EERS, INC.				TEST BORING LOG	?epo	Report of Soring No.: PTO-1 Sheet 1 of 1						
	: Location:	Mew Tersey			SAMPLER Type:E"split spoon [Magmer:140 pound Sall:3)"	į.	Ground water Depth Date Depth Date File Nov: 3013.312.331						
Forses	lo.: Eacin A:Rick Eacs Cicost: Jo	6.6			Soring Location: 38 Occupi Elevation: Dates: Startec:08/24.	e site plan 88							
	ı	Samole				Stratue Chance	T Equips		F:e!	d Tes	esting f		
lepth	No! Death	31:45	Peness:	Value	Sample Description	Seneral Descript	1 Instal	led	!	Sc Cond	UMU		
5-7	5-5.5	115,21	21/1.51	1 43	Hard.Red brown to grav.silty Clay or.	!	احج	3	_ ^		10 i		
		22.19	<u> </u>		Techus tamo. Janu.	İ	3	Z	- 4	in Ew			
	1		!				Junny		ا کام	Mo			
10-12	! !:)	127.23	127 0	3-	Dense, sig of spoor blocked by a piece	1			200	حی ر ۔ .			
	<u> </u>	111.10	!	1	of gniess.		1	1	S	,			
·		!	<u>!</u>	+			//=	-	ーフ	•			
5-17	1 15-17	7.13	2/2	23	Medium dense, grav weathered saporclite (<u> </u>	47	-50	LEB-	1 .2		
	1 1	1 :3.14		+	red brown veilow silty crusbly Glay. Streaks of black? wet.			- ;					
	1 [1	1	1 .		•	11-		! ! ! !		1 1		
20-22	;	1 11.13	12/2	1 25	Medius dense gray & plack to greenish			• _	. !				
		15,20	+	+	meathered sapprolite, saturated.		1/1-	-	! ! ! !				
	 	1	 	+		1	1 -		!!!	٠	!		
25-27	25-27	18.20	12:2	1-3	Jense.gray black & white samprolite.		1/1-	- /					
22-2/	=3-27	1 23.25	13.2		redoish brown coarse Sand.	!	1/1	- -		ANC			
	1	: :::::::::::::::::::::::::::::::::::::	!			i		-//			! ! ! !		
	, i	1	10:0	35	Very dense, gray, black, yellow.brown	! ;	-	_ / ;			1 2 1		
30-32	39-32	25,35	18/8	+==	striated sapprolive, fine-sedita sano.	!	1/ -						
	<u> </u>	50.57	 	-									
	<u> </u>	 	1 200	1 79	sane as above.	ļ	1/1=	(
35-37	35-36	-1.	2/1.1	+	sdat 45 10016.	!	-	. /			101		
		52,100/4	1			i •			. !		!		
				196	spoon refusal after 5°. same as apple.			. 6			1 1		
41)-42	+-)-40.	81 25,190.3	1 .3/ .3	1 100		ï	1/ =	1					
45-47	45- 0	100/0	2/0	190	spoon refusal.		=		! ! !				
	! !				Sedrock at 46'. Orilled to 47'.	1	1/1-	- ;					
	! !	!		!	Screen from 47% to 7%.					,			
	+ +		!					-	47	 			
	++-		+	+		ŀ							
	++	+	+	+									
	 	+	+	+									
	++	 	+	+	·								
			1				1		<u> </u>	<u> </u>	<u></u>		

G BRIEN & SERE Report of Boring No.: PTU-2 Sheet I of I TEST BORING LOG late Cate est Location: Washington Two. SAMPLER 'Ground Water Death Tvse:27split spoon Trammer:140 bound Yew Tense/ 12011 File Well 3013.023 Fall: 30* 'Acrist Deli Empire Scile 'Foreman: Rick Empson GBB Seoligist: John Knox Soring Location: SEE S Ground Elevation: --Dates: Started:06/85.33 see site bier Ended:05/24/88 Stratua Charga Field Testing Saasle Easisment | Installed | Sagele inaria Seneral Sassibi . Flows 50 !Senett: -4. Ceptn Description No! Jesth Recovery (Value) or ! Cond !HNU !s+! . 5 * Red brown, silty Sand aixing with sessies of govern. For of separation at 712 wer. 16-13 110-111 2/1.1 119 :1,:: Medium denselRed prangelsilt/ f-c Gard (sapproints), with large dieses of class granitic mock.Fe03 present. 124 15-17 (1 :5-.7 1 11.13. 3.3 4.... Screen from 40-51 Sand from 40-41 Sentonite from 4-3 Cament from 3-9 276 . .

COMBE FILL SOUTH LANDFILL PROJECT NO. 8455 MONITORING WELL S-4

EPTH	HNU	EXP	RAD	COMMENTS	LITHOLOGIC DESCRIPTION
0	_2.0B	OZB	.03B	6" steel pro-	Brown to yellow brown, clayey sandy silt; gravelly, some
	•			tector casing installed to 3'.	weathered granite gravel, sand fine to coarse. Trace garbage near 2'. (ML)
	0.8	5 Z	N	Cement grout seal	
0'	_1.0	4 Z	.01	Annular space backfilled with bentonite slurry	
•	1.0	42	.01	(3' to 18'). Peltonite seal 18' to 23'.	<u> </u>
20	_1.4	42	Ħ	Sand pack 23' to 42'.	
	2.6	52	N	4" dia., solid s.s. casing to 32'	Dark green to green brown, highly weathered granite saprolite, with much sand, soft.
0	_3.1	52	N	Top of 4" dia.,	
	1.8	32	N	20 slot s.s. screen - 32'. Some water here with a very	
.0	_2.2	42	n	strong odor.	
42	_ NI	NT	NT	Bottom of 4"	Brown green, hornblende granite.
₹			÷	s.s. screen -	

Filling Began: 12/4/84
Drilling Completed: 12/4/84

Well Construction Completed: 12/5/84

evelopment Completed:

Filler: William Stothoff Co.

Geologist: JST

Well Type/Aquifer: Shallow Mon./Saprolite

IJ DEP Permit No. 2525630

Total Depth: 42.0'

Screened Interval: 32' to 42'

Depth to Bedrock: 42'
Elevation T.O.C.: 810.33'
Elevation G.S.: 808.13'
SWL(Date): 798.00 (1/29/85)

Yield: 2 gpm

COMBE FILL SOUTH LANDFILL PROJECT NO. 8455 MONITORING WELL D-8

EPTH	HNU	EXP	RAD	COMMENTS	LITHOLOGIC DESCRIPTION
0	_NR	3 Z B	.04B	Cement grout seal to	Light to medium brown or green
0	_NR	2%	N	Annular space back- filled with bento- nite slurry. (3' to 45')	brown, clayey sandy silt; gravelly, some clay and gravel; much sand and silt, clay increases at 5', wet at 10'.
:0	_NR	5 Z 14 Z	N	10" hole to 48.4'.	目で、アンV (ML)
30	_NR	4Z 7Z	N		Green to green brown highly weathered granite saprolite with much medium to coarse quartz sand. Very soft, wet.
40	_NR	3 Z	Ņ	50.71 of 6" dis., SCH10, s.s. casing set at 48.4'.	
50	_0.2	NR	NR	6" hole 48.4' to 2 100'. WZN 50'.	された
60	_NR	NR	NR	WBZ 61' (3 gpm). Water has strong. odor and is foamy.	1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-
1.0	_0.9	07	NR	WBZ 67' (1 gpm). WZN 73.5'	Dark green to plackish green, hornblende granite. Much soft,
· •	_NR	nr	NR	WBZ 80-82' (approx. 15 gpm).	brown weathered zones, trace biotite and pyrite.
٦ ٥	_4.7	32	NR	Possible WBZ 93' Water has a strong "biting" odor-	1-1-7
10	_5.3 6.3	2%	NR	Bottom of well 100'.	」「ニペット」

Jrilling Began: 11/29/84 Drilling Completed: 11/30/84

Tell Construction Completed: 11/30/84 evelopment Completed: 11/30/84

Driller: William Stothoff Co.

Geologist: JST

%ell Type/Aquifer: Deep rock/granite
...J DEP Permit No. 2525639

Total Depth: 100'

Depth to Bedrock: 40'

Depth to competent Bedrock: 42°

Elevation T.O.C.: 810.16' 808.16 Elevation G.S.: SWL(DATE): 798.47' (1/29/85)

Yield: 20-25 gpm

4 4 SERE IRS. INC.				TEST BERING LOB	* *ep\$	ers of Bortro Brees :	No.: P		
Location:	Hashingt New Jane	on Two.		SAMPLER 'Type: 2'split spoon 'Hasser: 140 octon Fall: 21'	Ground Wat	er Sesti 19500 2013, 13,729	Gat. Gat:	5	
· Senie	361.5							Enced:) 9 (02 :
		9				: -	f:gl		
i (e¦ Capth	Plows /a*	Fanetr/ Recovery		Jeschiption	Teneral Testrica	Installed		Ea (
1:5-1:.4	19,21	18/1.47	1 32	Red-orange withing and black, silby for S	8-3	2 8	l :		
	21.35	1	1);,Blcs. U. F. Sapa-Silve.		ع الح		į	
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15-2±.5	25,40	2/1.6	1 53	Bray whose to preen, for Band, trustle	!	3 3		ļ	
i				meas of the shear track was	t	3 3	- 1		
i	<u> </u>			· ·		7 7	13	أسحره	75
135	100	0:0	196	Scoon refusal.	!	1/2 1/2	15-1	ļ	i
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	RS. INC. Location: (.3.3.5.F. 2.1. Eac.r 9.2. Eac.r 9.2. Eac.r 1.5-26.5	RS. INC. Location: Mashings New Tens (.J.3.5.9. Joepe Fi Lo.: Eacine Soils Pick Espson Locist: John Kno4 Samp. 1:5-15.4 19.21 21.35 1:5-26.5 25.40 1:5-3.59	RS. INC. Lecation: Washington Two. New Terse: (.J.3.5.9. Jame Fill South C.: Eacire Soils Plax Eacson Logist: John Know Sample Septh	RS. INC. Location: Mashington Two. New Terse: (.J.3.5.9. Joepe Fill South Lot Sapine Soils Rick Espech John Knox Sample Sapine Paneth/ INT Sapine Paneth/ Value 15-15.4 19.21 2/1.4 42 15-26.5 25.40 2/1.5 53 53.57	EST SCATNG USE Location: Washington Tac. New 1sts: New 1sts: New 1sts: No. 5. 10ee fill South Location: Samples Location: Sample Loca	Location: Washington Two. New Tene. (1.016.F. Date Till South Hazzer: 1-W counce Fall: 31* File Wol. 1. Sector Social South Hazzer: 1-W counce Fall: 31* File Wol. 1. Sector Social S	SAPPLEP New letter New lette	Sample Sample Section Sample Section Sample Section Sample Section Sample Section	Scattle Assington Two. Vew Street Vew Street

O'BRIEN & SERE Report of Boring No.: PTO-3 Sheet 1 of 1 TEST BORING LOS et Location: Washington.Two. SAME! ER Ground water Cepth Date Yew Jersey Tilent:N.I.J.E.P. Comps Fill South Type: Efficiet spoon !Hammer: 140 cound Sate Fall: 32* Bering Co.: Espire Boils Foresan: Rick Espson 1986 Beologist: John Knox Scring Locations sae site plan Bround Elevations sae site plan Dates: Stantep://3/31/89 Ended:09/01/88 Stratus Thence Serera: Sample Field Testing Bassie Equipment Installed 91.0**8**5 Penetr/ 74. 'Decth Description So Recovery (Value) Mc Jeosa on | Cond | HNU | se Jeschipt 1:5-17 51.33 1.75/1.71 55 Red-brown velicw gray.silov fro Sand weathered sapprolite 25.100-3*1 dry to dags -CEMEN 125-25.47 17.13 25-27 12/1.4 153 Braviabite/black solty for Band. weathered sacorolite.wet. LE .53 OUTE 35-37 .1/31 150 Socon refusal. SCREEN 145-45.51 (3,2) 148 3/1.5 Red-pranquitan to place sailty for Band. weathered secontility. 29,35 (55-55.51 :00 .5 .5' 1100 Brown-orange, salty for Sanc. meathered , K- SALO sacorpiuse. Auger refusal at 50 . 240

] BRI ENGIN	EN 1 SERE EERS. INC.				TEST BORING LOS	Repo	rt:		1 of 1	PT0-4			
	: Location:	Yew Jers	₽Y		SAMPLER Type: 2" split spoor hammer: 140 pound Fall: 30"	Ground wat	-	00:5	7.5	ite.			
ere sa	Co.: E so ir n: Rick Eso clogist: Io	SOR			Boring Location: see Bround Elevation: se Dates: Started:08/89	<u> </u>					Ended: 08/31/88		
	Sample					Stratue	;	•	Fie	ld Te	sting	18	
leota .	No Sepan	Blows /5°	Fenetr/ Recovery	value	Rample Description	Change Equipme Seneral Install Descript			2H			9	
-7	5-5.7	6.15.	[217.7]	137	Red-orange, silty for Band, to, sacorolite.		3		3		7 0	Ť	
	!!	122.12			large pieces of gramite, dr		3		<u> </u>		!	!	
0-121	110	:00	10:0	1:00	Socon refusal,bouncing on boulder gring to 15-17' for sample.		NV		MANAMAN	THEM!		!	
	1 :5	100	1.:/.:	190	Trangé-gray solty f-c Sandusacorolyce.	!	" III wormyning		PE BE	non		1	
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)-8 2	1		1 1.8/1.8	125	Brown to grav.fmc sand.weathersd sapprolite,wet.	! !	ļ.,	-	191	! •	0	-	
	! !	1007.5	1	! !		1		Ξ	e Sc }	LEEN	. ! !	!	
5-27	25-25.3	100/.3	.3/.3	100	Grav.black and white, highly weethered sapprolite.	t 1				i ! !	0	!	
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·	30	100/0	0.0.	1100	Scoon refusal.	† ·		三					
	35	1 100/0	133	1100	Socon refusal.	<u>.</u> <u>.</u>	4		' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '	no	!	!	
u ĝ	(4)	100/0	127	130	Scoon refusal.	! ! !	٠,	三		! ! !	!	!	
5-47	45-46.3	55,43,	1 2/1.31	157	Redmorange to gray with green stratification. For sand and granupe		1	二 二			!		
٠		24.35	!	-	stratification.frc sand and granuse peoples.			三			1.5	!	
J-52	50-50.1	1 100/.1		1:00	No recovery, refusal.			三	*** *** ***			!	
		!	<u> </u>		Auger and spoon refusel at 55 .			<u>=</u>	53	•	!		
		!			•								
		!	!										
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					·								

COMBE FILL SOUTH LANDFILL PROJECT NO. 8455 MONITORING WELL S-3

?TH	HNU	EXP	RAD	COMMENTS	LITHOLOGIC DESCRIPTION
0	_ NR	NR	NR	6" steel protector C casing installed to 3'. Cement grout seal	Medium to light orange brown, gravelly, silty sand. (SP)
:0	_1.0	oz	NR	Annular space back- filled with bento- nite slurry. (3' to 34'). 4" dia. SCHIO.	Light orange brown, sandy, clayey silt. (ML)
20	-1.2	NR	nr	Approx. 5 gpm of water in over-burder, fairly	Brown green, sandy silt. (SM)
_0	_1.6	OZ.	NIR .	vater in over- burder, fairly strong odor.	•
	_ nr	NR	ŅR	from 34' to 35'. Sand pack from 35' to 49.5'. Top of 4", 20 slot s.s. screen 37.5'.	Green brown, granite saprolite with much sand and some silt. Very soft.
9.5	— NR	NR	NR	Bottom of 4', 20 slot, s.s. screen	Green to brown green, hornblende granite. Much quartz.

Drilling Began: 12/26/84 Drilling Completed: 12/27/84

Well Construction Completed: 12/28/84

Development Completed:

Driller: William Stothoff Co.

Geologist: RCW

Well Type/Aquifer: Shallow 1./Saprolite

U DEP Permit No. 2525629

Total Depth: 49.5

Screened Interval: 37.5' to 47.5'

Depth to Bedrock: 46' Elevation T.O.C.: 809.93' Elevation G.S.: SWL(DATE): 785.35' (1/29/85) Yield: est 5 gpm (open hole)

COMBE FILL SOUTH LANDFILL PROJECT NO. 8455 MONITORING WELL D-9

DEP	LH.	HNU	EXP	RAU	COMMENTS	LITHOLOGIC DESCRIPTION
	_	3.0B	2 7 B	.02B		
10	_	1.0	102	.02	Cement grout seal to 2'. Annular space back- filled with bento-	Orange-brown, clayey, gravelly, sandy silt. Some weathered granite gravel, cobble and sand boulder sized, trace clay, some sand increase with depth.
20	-	1.6	42	.03	nite slurry (2' - 81'). 10" hole 0 to 81'.	
30	-	NR	NR	nr	-5 gpm water in overburden. 83.5' of 6" dia., SCH 10. SS casing set at 81'.	As above but increased silt and fine sand content. Brown-green to green-brown highly weathered granite saprolite. Much
40	-	2.2	32	.02	6" hole from 81' to 125'.	quartz.
50	-	3.6	12	.02	Strong garbage- type odor noticed near 35'.	Green-brown highly weathered granite saprolite and highly weathered granite
	-	1.6	12	NR		bedrock. Some saprolite, much weathers. granite, very hard in zones.
70	-	4.0	22	NR		
80		1.2	27	.02	WBZ 83' (1 gpm)	
90	-	1.4	02	NR		Srown-green, gray and green-gray granit very hard. Much hornblende.
100	•	NR	NR	NR.	WBZ 102' (10 gpm) WBZ 107' (5 gpm)	
110	_	NR	nr	NR	#52 107 (3 6P=7	
120	_	NR	NR	NR		
125	_	NR.	NR	NR		L_F1/21/2
Vertical Scale 1" = 20'						

Drilling Began: 12/19/84

Drilling Completed: 12/26/84

Well Construction Completed: 12/26/84

Development Completed: 12/26/84

ller: William Stothoff Co.

Well Type/Aquifer: Deep rock/granite

MI DEP Permit No. 2525640

Total Depth: 125'
Depth to Bedrock: 50'
Depth to Competent Bedrock: 75'
Elevation T.O.C.: 809.24
Elevation G.S.: 807.24'
SWL (Date): 783.03' (1/29/85)
Yield: 16 gpm

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) PIPERS INC. Report of Boring No.: PT-3 Sheet 1 of 1 TEST EDRING LOS ot Laration: Washington Two. New Tersey "Client: M.J.J.S.P. Idaba Fill South Ground water Gesth]a:8]a:8 SAMPLER Type:2"split spoon
"Hammer: 140 pound Falligh 'Boring Toli**Espire** Boils 'ForewaniRick Espaon 'CBE BeologistiCon Know - Bering Location: see site plan ! Ground Elevation: --! Dates: Startec:08/23 35 Ended: 19/23/98! Saas le Field Testing Esuisser: Installes Sagola Flore Penetr: ! "N" 20:5 Description 30 Peccyry | Value Yel Besth of I Come !HNU 541 Medius Dense. Yellowish brown, silty coarse Band.daso. Beginning of sacorolise. too of socon plugged with oneiss. 15.7 121.51 :2: 110.13 Pefusal on spoon.
Hard drilling à 161.
Auger refusal à 171.
Screen from 171 to 41. 1:00 100 3* 1 9/0 · ESMO

Report of Boring No.: PTO-5 Sheet I of I O'BRIEN & GERE ENGINEERS, INC. TEST BORING LOS Ground Water Depth Date SAMPLER oject Location: Washington Township Fall: 30 inches File No.: 3013.012.920 New Jersey Client:N.J.D.E.P. Combe Fill South Type: split spoon Hammer: 140 pound Boring Location: see site plan Ground Elevation: --Dates: Started:08/22/88 Boring Co.: Empire Soils Foreman: Rick Empson OBS Geologist: John Knox Ended:08/22/88 Testing Stratue Sample Equipment Installed Sample Description Change General "N" Penetr/ Blows Depth HMU Descript Cond 51 Value 16 Recovry No Death Dense, yellow red, fine sandy Silt, coarse sand & gravel, dry to damp. 0 2'/.8 16,30,17,9 5-7' 20 0 Very loose, gray & yellowish brown sandy Silt to silty Sand, saturated. 2 21/1.1 1,1,1,2 10-12 Medium dense, olive gray, silty c- Sand, sapprolite, boulders. 2/.75 17 5,7,10, 15-17 **)**1 100/5 Sooon refusal, drilled to 25' set screen 100/0 0/0 20-22' (from 24-4'. 285

Report of Boring No.: PTO-6 Sheet 1 of 1 O'BRIEN & GERE ENGINEERS, INC. TEST BORING LOG SAMPLER Ground Water Depth roject Location: Washington Twp. Date Type:2°split spoon Hammer: 140 pound New Jersey Client: N.J.D.E.P. Combe Fill South Fall: 30° Boring Location: see site plan Sround Elevation: --Dates: Started:08/23/88 Boring Co.: Empire Soils Foreman: Rick Empson 1886 Geologist: John Knox Ended: 08/23/98 Field Testing Stratue Sample Change Seneral Equipment Installed Sample ·y. Description Penetr/ Blows Deoth Cond HMU ρH 15# Descript No Depth 16. Recovry Value Very loose, yellowish brown, coarse sandy Silt, saturated. 1,2,1,2 2/1.15 3 10-12' 3 Very dense, gray, silty coarse Sand, large pebbles (sapprolite) 0 1.5/1.0' 151 15-17' 24,51, SteEE 100/3 100 Refusal, set screen from 21-4'. 20-22' 100/0 0/0 Espus

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COMBE FILL SOUTH LANDFILL PROJECT NO. 8455 MONITORING WELL S-1

Depth HNU	EXP	RAD	COMMENTS	LITHOLOGIC DESCRIPTION
0-1.0B	028	NT	6" Steel protector []	Green brown to yellow brown, sandy silt; some gravel and cobbles;
2.6	2%	NT	Cement grout seal	trace clay. Garbage encountered at 2'. Saturated at 4' to 5'. (ML)
10-3.5	3 z	nt	Annular space back- filled with bento- nite slurry (3'-8')	Clay content increases.
2.6	5 Z .	NT	4" dia., SCH10, solid s.s. casing to 14 Peltonite seal 8'	Green brown to brown green, granite sapprolite. Very sandy. Some gravel. Highly weathered. Soft. Huch water at 20'. Water is foamy.
20-4.0	52	NT	Top of 4" dia., 20 slot, S.S. screen	
25-2.2	2%	nt	Sand pack 11'-25' Bottom of 4" dia 20 slot, S.S. screen 24'	Dark green, granite bedrock.

rilling Began: 12/18/84
Drilling Completed: 12/18/84

Well Construction Completed: 12/19/84

Development Completed:

Driller: William Stothoff Co.

Geologist: JST

Well Type/Aquifer: Shallow Mon./Saprolite

MJ DEP Application No. 2525627

Total Depth: 25'

Screened Interval: 14' to 24'

Depth to Bedrock: 23.5'
Elevation T.O.C.: 793.67;
Elevation G.S.: 791.27'
SWL(DATE): 787.96 (1/29/85)

. Yield: 10-20 gpm

COMBE FILL SOUTH LANDFILL PROJECT NO. 8455 MONITORING WELL D-7

EPTH	HNU	EXP	RAD	COMMENTS	LITHOLCIC DESCRIPTION
					
0	_0.5B	OZB	.038	Cement grout seal C	Light to medium brown, sandy, gravelly silt. Moist. (ML)
10	_0	02	N	Annular space back- filled with bento- nite slurry.	Light to medium brown, clayey silty sand; gravelly, trace
20	_0.7	2%	N	(3' to 45') 10" hole 0' to 45'. Much water in overburden.	clay, trace gravel, some silt, much sand. Wet. (SM) Green gray highly weathered
30	_0.4	NR	H	47.3' of 6" dia., 5 SCHIO, s.s. casing 5 set at 45'.	granite saprolite with much sand. Much granite gravel, cobble and boulder sized, wet, soft zones.
40	_NR	nr	NR	6" hole 45' to 125'	Green gray hornblende granite with brown weathered zones. Pyrite present as crystals and
50 -	_2.0	32	NR .	WB2 47.5-48'. (20 gpm). Strong odor to water. WBZ 54' (2 gpm).	stringers. Trace biotite. Hardness increases with depth.
	_NR	NR	. NR	wzn 60.5'. wzn 65'.	
70	_5.6	5%	.02	WBZ 68.5 (1 gpm). WZN 74'.	77' buff to light gray biotite granite. Appears gneissic. Hard. Some biotite in layers.
80	_2.2	2%	N -	WBZ 77° (2 gpm). Water very foamy.	ジントレー パーレー
90	_2.2	21	NR	wzn 98'	38' pale to dark green biotite, hornblende granite. Some pyroxenes or amphiboles. Biotite increases with depth.
00	-5.8	42	NR		
10	_2.0	NR	NR	WBZ 112.5' (2 gpm)	12.7%
20	0.8	2%	NR	WBZ 122' (3 gpm)	スプル
125	_1.6	32	.03	Water very foamy. Bottom of well 125'.	

rilling Began: 12/11/84

rilling Completed: 12/17/84
Well Construction Completed: 12/17/84

"Evelopment Completed: 12/17/84

riller: William Stothoff Co.

ist: JST

ype/Aquifer: Deep rock/granite J DEP Permit No. 2525638

Total Depth: 125'

Depth to Bedrock: 37'

Depth to Competent Bedrock: 37' Elevation T.O.C: 792.65'

790.98 Elevation G.S.:

SWL(DATE): 786.88' (1/29/85)

Yield: 30 gpm

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G'BRIEN 1 BERE ' TNEERS, INC.					-	TEST BERING LIG	i sep	ert c	f Boring Sheet !	No.:	PT-4		•
tt Location: Washington Two.				<u>a</u> v		SAMPLER Type: 27split spoon Hammer:1-0 pound Fail: 30*	Ground Water Depth Date Depth Date File Mount 5013.012.720						
367173 967992 968 38	2: n: o.::	i Escit Lity Escit Lity Esci	e Bolle sen an knex			. Soring Location: eee ! Sround Elekation: ee ! Dates: Standed:09/18	aise plan Gaite plan GB				Ended:	99708	/98
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					TEST BURING LOS	Report of Boring No.: PTO-7 Sheet 1 of 1					
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Report of Boring You: PTO-8 Sheet i of 1 TIPRIEN & BERE TEERS, INC. TEST SORING LOS Date Date SAMPLES 'Should water Beoth Location:Washington Two. |Type:2"split spin |'Mammar: (4) count Tests 4:0: 35:3:0:2,920 New Jersey Dient: N.J. J.E.P. Coabe Fill South Fall: 30* Foring uscasion: see site slar Bround Elevation: see site slan Bates: Stanteon F 17 38 Boring Io.: Empire Soils Foreman: Rick Empson IBS Teologist: John Knot Ended:09/08/88! 1 1-3:.3 Fiels Testing Sagole. Equipment ! Installed ! Baec la Peretri I "N" Description Blows Cepth aH | Cond | HNU | S# ! Descript ! 'hal Depth ! 'Recovey !Value! 1/5* 3 + CEMENT Grance order to tancolayer salty for Sand, 12/1.1 17 ::5-:2 T 110-11.11 pranitic sacorolite, saturated, 3.3 12.0 ...! 3.0 -SCEEEN Red-crange to dark brims to same structures' clayer silby f-c Sand. practice secondite 12/1.5 1+5 31-22 1 129-21.51 10.17. 25.35 Auger refusal at 24.51.

COMBE FILL SOUTH LANDFILL PROJECT NO. 8455 MONITORING WELL S-5

HIE	HNU	EXP	RAD	COMMENTS	LITHOLOGIC DESCRIPTION
0	_1.08	0 Z B	.03B	6" steel pro-	•
	0.2	02	N	Cement grout seal	Orange brown, sandy clayey silt; gravelly, trace of granite gravel, sand occurs in lenses, cohesive
10	_0.2	0Z	N	Cement grout seal to 3'. Annular space backfilled with bentonite slurry (3'-15'). Peltonite Seal	slightly moist to moist. Wet at 10'. (ML)
	0.4	02	H	Peltonite seal from 15' to 17'.	
20	_0.2	02	N .	Sand pack from 17' to 29'. Top of 4" dia.,	Yellow brown to green brown, highly weathered granite
	0.5	12	N	screen - 19.	saprolite with much sand. Soft.
29	_0.8	02	H	Much water around 26'. Bottom of 4" dia., 20 slot, s.s. screen to 29'.	Green, hornblende granite.
				Bottom of hole 29'.	

Drilling Began: 1/22/85 Drilling Completed: 1/22/85

Well Construction Completed: 1/22/85

Development Completed: 1/23/85 Driller: William Stothoff Co.

Geologist: JST

Well Type/Aquifer: Shallow Mon./Saprolite
MJ DEP Permit No. 2525631

Total Depth: 29'

Screened Interval: 19' to 29'

Depth to Bedrock: 29° Elevation T.O.C.: 804.77' 801.98' Elevation G.S.: SWL(DATE): 796.50' (1/29/85)

Yield: 10-20 gpm

MEMO TO THE FILES

FROM: R.P. Cawley 72/C

RE: Combe Fill South Landfill -

Aquifer Performance Test

FILE: 3013.012 #3

DATE: February 2, 1989

CC: S.J. Roland

G.A. Swenson A.J. Caracciolo

This memo is a summary of the aquifer performance tests conducted at the Combe Fill South (CFS) Landfill in Chester and Washington Townships, Morris County, New Jersey. O'Brien & Gere has been retained to develop design criteria and the necessary data base for the Remedial Design of the CFS O'Brien & Gere has developed supplemental investigation tasks for this remedial design which are discussed in detail in the Field Sampling and Testing Plan (FSTP), November 1988. One of the investigatory tasks The aquifer designed is the completion of Aquifer Performance Tests. performance tests (pump tests) were conducted at four (4) locations on the perimeter of the landfill. These locations were selected for two reasons: 1) the cumulative data from these locations would allow for an overall evaluation of aquifer characteristics, and 2) bedrock and overburden well clusters, present at each area, would also provide information on the possible communication between the overburden and bedrock aquifers. On-site monitoring wells and pump test locations are shown on Figure 1.

Each pump test location consisted of five (5) wells: one (1) existing bedrock well; one (1) existing overburden well; two (2) newly installed observation wells and one (1) newly installed pump test well. Pump tests were performed using a submersible pump and water levels were recorded using an Enviro-Labs, Inc. Data Logger. The Enviro-Labs system utilizes a microcomputer and up to eight (8) pressure transducers to record ground water level data in real-time and to store the data in its memory. Hand measurements, using an electric well probe, were also recorded to supplement and verify the data logger. Pumping equipment and labor were supplied by Empire Soil Investigations Inc. of Highland Park, New Jersey, an approved subcontractor for this project.

Prior to initiating the pump tests water levels were recorded at on-site overburden monitoring/observation wells. A summary of the water level data collected is provided in Table 1.

The newly installed pump test wells and the observation wells screen the entire overburden aquifer. Boring logs for all wells monitored during this program are included in Attachment 1.

The pump tests were performed with the submersible pump set approximately one (1) foot above the bottom of the pumping well screen. Since the Data Logger was capable of recording eight (8) channels, two (2) probes were placed in three (3) of the wells at each location as a precautionary measure in the event a probe malfunctioned. Once the pumping rate was selected and the water table reached static equilibrium the aquifer performance test was started and ground water levels were monitored for a continuous pumping period of 48 hours. After the 48 hour period, recovery data was monitored until the pumping well reached approximately 95% recovery.

The hard data stored by the Enviro-Labs System is included as Attachment 2. This data was reduced to establish transmissivity and storage coefficient values for the overburden aquifer using conventional distance-drawdown and time-drawdown methods as proposed in the FSTP. In addition, the recovery data was also used to verify the results of the distance-drawdown and time-drawdown methods. Each method utilized is described in the following section.

DATA REDUCTION METHODS

Distance-Drawdown Method: The distance-drawdown method requires the semi-log plotting of a single data point from each well monitored during the aquifer performance test. Drawdown data from a minimum of three (3) monitoring/observation wells is plotted on semi-log paper and a straight line is drawn (attempting to connect data points) representing the cone of depression. The drawdown data utilized must be for one (1) specific point in time and must be late in the pump test. The late data is used to eliminate the variability in water levels typically seen in early data and to use data which is no longer under the effects of delayed drainage. The slope of the straight line graph is utilized in determining transmissivity. Transmissivity is calculated using T = 528 Q/ds (Cooper & Jacob - 1946) where:

T = Transmissivity (gpd/ft)

Q = Pumping rate (gpm)

ds = (ds = delta s) Slope of the distance drawdown graph expressed as the change in drawdown between two (2) values of distance over a full log scale.

The distance-drawdown method theoretically uses data which is no longer influenced by the effects of delayed drainage. Minimum pumping times for typical aquifer materials are discussed by Todd (Ground Water Hydrology, 1980; p. 136) and suggest the following minimum pumping times to compensate for delayed drainage:

Medium sand and coarser Fine sand Silt and clay 4 hours 30 hours 170 hours

A review of the distance-drawdown data for locations PT-1, PT-3 and possibly PT-4 indicate that these tests may still have been under the effects of delayed drainage at the 48 hours point of the test. Data reduction results are discussed in detail for each pump test in later sections.

Time-Drawdown Method: This method of analysis also called Jacob's Straight Line Method utilizes the plotting of drawdown data versus time in a single observation well. This data is graphed using semi-log paper. Theoretically this produces a straight line graph of the data points. This straight line is then used to calculate a slope for the drawdown data. Transmissivity is calculated using T = 264Q/ds (Jacob and Cooper - 1946) where:

T = Transmissivity (gpd/ft)
Q = Pumping Rate (gpm)

ds = (ds = delta s) Slope (ft) of the time vs. drawdown graph.

Following the calculation of transmissivity the storativity value was calculated using $S = Tto/4790 r^2$ where:

S = Storativity

T = Transmissivity (gpd/ft)

to = the point where the straight line intersects the horizontal axis at drawdown equals 0 (min).

r = radius of the observation well from the pumping well (ft).

This method of analysis is discussed in detail by Neuman in Attachment 3. The actual data plots for this program do not typically result in one (1) straight line plot. A separate straight line can be drawn through both early and late data giving different slopes. When different slopes are plotted the late slope may be the result of delayed drainage. Where this is the case, storativity would be best calculated using the type curve method. The two slopes plotted probably reflect early and late data. The early data will result in the calculation of elastic storage and the late data (in theory) the specific yield. Since the late data may be under the effects of delayed drainage, elevated values of S and T may result using this method. An evaluation of data is provided later in this memo. This equation utilizes an exponential integral "u" also known as the well function. It should be noted that the straight line approximation utilized for this method is limited to values of "u" less than 0.01. Using this method for values of u greater than 0.01 could result in large errors. Pump Test #4 is the only location where a straight line plot results. The T & S values calculated are most likely representative values.

Type Curve Matching Method: The type curve matching method requires the plotting of drawdown data versus time on log-log paper. This produces a curve which is then superimposed with type curves and a suitable match is obtained between the type curve and the field data. This methodology was developed by Prickett (1965) in connection with Boulton's theory (1963). Once a type curve has been matched specific calculations are performed to

determine transmissivity and specific yield. O'Brien & Gere utilized a computer Graphical Well Analysis Package (GWAP) to perform the data reduction and related calculations. A description of the GWAP program functions and program features is provided as Attachment 4. A more detailed description of the type curve matching method for unconfined aquifers as described by Neuman is provided in Attachment 3.

The GWAP program required the re-structuring of the data from the Enviro-Labs system. The Enviro-Labs system provides first-in, last- out data as well as real time recording. In order to convert this to be GWAP usable, the data had to be flipped over (i.e. first-in, first-out) and the real time converted to total minutes. This revised data for each well is included in Attachment 5.

Recovery Test Data Method: The recovery test data method is calculated by plotting residual drawdown versus a ratio of time on semi-log paper. The recovery data is recorded from each well after pumping stopped. The recovery data is then plotted versus the ratio of t/t. Where t/t is the ratio of time since the pump test started (t) and the time since the beginning of the recovery period (t). Theoretically the plotting of the ratio t/t versus recovery data produces a straight line graph. This graph is then used to calculate slope. Transmissivity is then calculated using T=264 Q/ds (Jacob & Cooper - 1946) where:

T = Transmissivity (gpd/ft)
Q = Pumping Rate (gpm)
ds = (ds = delta s) Slope (ft) of the recovery data graph

Each individual pump test (problems encountered, recording information and calculation summary) is summarized in the following sections.

AQUIFER PERFORMANCE TESTS

A total of five (5) wells were monitored during each pump test. These wells consisted of the pumping well (designated "PT"), two (2) observation wells (designated "PTO"), a shallow existing monitoring well (designated "S") and an existing bedrock monitoring well (designated "D"). Figure 1 is a site plan which depicts the location of all site monitoring/observations wells. For each pump test the discharge water was pumped to the first swale or low lying area encountered at the top of the landfill.

PUMP TEST #1: Pump test #1 was performed from December 5 through 8, 1988 and utilized wells: PT-1; PTO-1; PTO-2; S-4 and D-8. A general geologic cross-section of this location is provided as Figure 2. An average discharge rate of 5.2 gpm was set at the well head and monitored hourly from the discharge point at the top of the landfill. The well number, corresponding data logger channel and pressure transducer sensitivity are as follows:

Well No.	Radius (ft)	Channel No.	Transducer (psi)
PT-1	0.3	Ch1	25
PTO-1	5	Ch2 & Ch3	5 & 1 5
PTO-2	20	Ch4 & Ch5	5 & 1 5
S-4	45	Ch6 & Ch7	5 & 1 5
D-8	26	Ch8	5

The data logger was set to record measurements at the following times and intervals:

Date	Time (hours)	Recording Interval
12/5/88	1659-1702 1700 1702-1730	1 reading/second Pump start 1 reading/30 seconds
:	1730-1805 1805-1925 1925-2125 2125	1 reading/5 minutes 1 reading/15 minutes 1 reading/30 minutes 1 reading/60 minutes
12/7/88	1658-1722 1721 1722-1731 1731-1750 1750-1815 1815	1 reading/second Pump off 1 reading/30 seconds 1 reading/minute 1 reading/5 minutes 1 reading/60 minutes
12/8/88	0615	End test

During the pump test at approximately 00:25 hours on January 7, 1988 (30 hours into the pump test) water levels began to rise in each well. An increase of approximately 1.5 feet was realized in PT-1. A gradual rise was also observed in the surrounding wells. Each well responding at the same time in the same way may be due to a uniform distribution of recharge. This location is also immediately adjacent to the former leachate collection system (O'Brien & Gere has no information regarding this system). This system may have caused some type of recharge to the water table aquifer. In addition, the duration of the pumping may have improved the development of the well resulting in a rise of water levels.

The transmissivity and specific yield valves calculated for this pump test have been summarized and are provided below:

Pump Test #1 Data Summary

Q = 5.2 gpm b = 37 ft (PT-1)

Transmissivity (gpd/ft):

Well No.	Type Curve Elastic-Delayed	Jacob	Recovery	Average Value
PT-1	266-367	280	254	292
PTO-1	507-966	673	639	696
PTO-2	1190-1530	1907	1525	1538
S-4	1040-1600	1990	1445	1518
			Average	1011
		•	Distance-Drawdown	722

Storage (S):

	Type Curve Elastic-Delayed	Jacob (Elastic)	Average Value Elastic-Delayed
PT-1	0.01-0.33	-	0.01-0.33
PTO-1	0.004-0.12	0.028	0.02-0.12
PTO-2	0.002-0.02	0.001	0.002-0.02
S-4	0.0006-0.007	0.0004	0.0005-0.007
		Average	0.008-0.12
		Distance-Drawdown	0.12

The graphs and calculations used to develop this summary are provided in Attachment 6.

The average transmissivity (T) for this location was 1011 gpd/ft. The average hydraulic conductivity (K), using a saturated thickness of 37 feet, is 27 gpd/ft² (K = T/b). The range of T observed for this location was 254 to 1.990 gpd/ft with the value increasing as the distance from the pumping well increased. Since the pumping rate was only 5 gpm and the material observed was typically silty sand the lower values (between 250 and 1,000 gpd/ft) are expected to be more representative of the aquifer at this location. The higher values further from the pumping well most likely reflect the influence of delayed drainage. The value of b for the area appears to be constant, therefore, an average value of K of 27 gpd/ft² appears representative.

The range of average storage values for this location is 0.008 to 0.12. The distance drawdown value is 0.12. The high end average value and the distance-drawdown value of 0.12 is closer to the specific yield that would be expected for an unconfined aquifer. The low values (0.008) are representative of the elastic responses of the aquifer.

The water level in the bedrock monitoring well (D-8) decreased approximately one (1) foot over the duration of the test. This decrease was slight and gradual following initiation of pumping, indicating that the overburden and bedrock aquifers are in hydraulic contact at this location.

PUMP TEST #2

Pump Test #2 was performed from November 29 through December 2, 1988 and utilized wells: PT-2; PTO-3; PTO-4; S-3 and D-9. A general cross-section is provided as Figure 3. An average discharge rate of 2.3 gpm was set at the wellhead and monitored hourly from the discharge point at the top of the landfill. The well number, corresponding data logger channel and pressure transducer sensitivity are as follows:

Well No.	Radius (ft)	Channel No.	Transducer (psi)
PT-2	0.3	Ch 1	5
PTO-3	5	Ch 2 & Ch3	5 & 15
PTO-4	10	Ch 4 & Ch 5	5 & 15
S-3	55	Ch 6 & Ch 7	5 & 15
D-9	37	Ch 8	25

The data logger was set to record measurements at the following times and intervals:

Date	Time (Hours)	Recording Interval
11/29/88	1159-1202	1 Reading/Second
	1200	Pump Start
	1202-1210	1 Reading/30 Second
	1210-1235	1 Reading/Minute
	1235-1305	1 Reading/5 Minutes
	1305-1415	1 Reading/15 Minutes
11/29/88	1415-1615	1 Reading/30 Minutes
11/30/88	1500	1 Reading/60 Minutes
12/1/88	1215-1217	1 Reading/Second
, -, -,	1215	Pump Off (Recovery)
	1217-1227	1 Reading/30 Second
	1227-1245	1 Reading/Minute
	1245-1330	1 Reading/5 Minutes
	1330-1430	1 Reading/15 Minutes
	1430	1 Reading/39 Minutes 4
12/2/88	0600	End Test

During the pump test at 16:15 Hours on November 29, 1988 the data logger stopped recording. On November 30, 1988 at 1500 hours the logger began recording at hourly intervals. A total of 23 hours of data was not logged, this is probably due to an error in the entry of recording commands by the user. A review of the reduced data shows that the 23 hours of data does not represent a major portion of the drawdown curves for time-drawdown analyses. The data collected after 1500 hours on November 30, 1988 was used in the distance-drawdown analyses. Recovery data was obviously not affected. It is apparent that the 23 hour data lapse did not affect the overall analyses of this location. In addition, the hand water level measurements collected supplement the lost data and show that little variation occurred during this time period. Due to insufficient drawdown no calculations or data reduction was performed on Monitoring Well S-3.

The transmissivity and specific yield values calculated for this pump test have been summarized and are provided below.

Pump Test #2 Data Summary

Q = 2.3 gpm b = 12 ft (PT-2)

Transmissivity (gpd/ft):

Well No.	Type Curve Elastic-Delayed	Jacob	Recovery	Average Value
PT-2	604-618	867	607	674
PTO-3	427-726	934	810	724
PTO-4	1150-1030	979	723	971
S-3	-	-	. -	-
			Average	790

Distance-Drawdown 1412

0.0003

Storage (S):	Type Curve Elastic-Delayed	Jacob (Elastic)	Average Value Elastic-Delayed
PT-2	0.007-0.12	•	0.007-0.12
PTO-3	0.002-0.003	0.002	0.002-0.003
PTO-4	0.009-0.02	0.01	0.01-0.02
S-3	•	-	-
		Ave rage	0.006-0.05

255

PROJECT NO. 8455 MONITORING WELL D-4

PTH		HNU	EXP	RAD	COMMENTS	LITHOLOGIC DESCRIPTION
0	-	NR	NR	nr	Cement grout seal to	Fig.1 and sandy ctayey sitt; gravetry. trace
.0	-	0.6	02	NR	Annular space back- filled with bento- nite slurry which had cement added to	fine to coarse quartz sand. Some granite cobbles, cohesive, wet at 10'. (ML and CL)
:0	-	1.4	02	NR.	the lower 3 to 4'. M. 10" hole to 35'. 37' of 6" dia	Green brown to brown, granite saprolite with much sand, loose wet.
10	-	2.2	12	NR	sct at 35'.	<u> </u>
•0	_	NR	NR	NR	6" hole from 35' to 22 125'. WZN 37' Much water (15-20 gpm)	
50	_	0.4	.02	.02	in overburden.	
	-	.0	0Z	H	WBZ 61' (4 gpm) Mudfilled WZN 68'.	
70	-	0.2	07	Ħ	wzn 78'.	Alternating gray or white, biotite granite (possible quartz diorite) and dark green, hornblende granite (Possibly some amphibolite or
80	-	0.2	0 Z	N	wzn 86'.	pyroxenite). Biotite zones yield reddish water, much pyrite is zones, some silt and sand seams.
30	-	0.4	02	n	WBZ 95.5-98'	
) 0	_	0.3	0 Z	N	(trace)	
10	-	ò	02	Ħ	Possible slight odor to water.	
20	_	NR	NR	NR		
.25	-	0	NR	NR	Bottom of well 125'	

rilling Began: 1/14/85
_rilling Completed: 1/18/85
Well Construction Completed: 1/18/85
evelopment Completed: 1/18/85
riller: William Stothoff Co.

ist: JST

J DEP Permit No. 2525635

Depth to Bedrock: 26.5'
Depth to competent Bedrock: 28'
Elevation T.O.C.: 803.69'
Elevation G.S.: 802.13'
SWL(DATE): 795.69' (1/29/85)

Yield: 4 gpm

VII. Interim Environmental Monitoring (First Round)

MEMO TO THE FILES

FROM: N.R. Wilkinson

RE: Combe Fill South Landfill -

Interim Environmental Monitoring

Program - Round 1

FILE: 3013.012 #3

DATE: September 20, 1991

CC: S.J. Roland

A.J. Caracciolo, III

The purpose of this memorandum is to provide an explanation of the first sampling event at the Combe Fill South Landfill and present the results of that event. This section describes the methodologies employed for sampling and analysis and discusses problems and deficiencies associated with the program.

The objective of the first sampling event was to:

- supplement previously collected data;

evaluate off-site migration of contaminants;

- assess health and environmental effects of contaminants; and

help provide guidance for writing a long term monitoring plan.

The first sampling event was conducted from November 30, 1988 to January 10, 1989. Sampling was conducted in accordance with the Interim Environmental Monitoring Plan, November 1988. This plan detailed the collection and analysis of air, surface water, sediment and ground water samples. Sample collection methods were developed in accordance with the procedures outlined in the NJDEP document entitled "Field Sampling Procedures Manual", February 1988. Based on analytical data reported in the Remedial Investigation/Feasibility Study (LM&S Engineers, May 1986) and considerations presented in the Final Conceptual Design Report (LM&S Engineers, 1987), samples were analyzed for USEPA Target Compound List (TCL) volatiles, TCL semi-volatiles and metals.

The procedures used for analysis were in accordance with NJDEP Contract Laboratory Protocols (CLP) Tier-I and Tier-II. Approximately 40 percent of the samples were analyzed per the guidelines in Tier CLP-I with the remaining samples being analyzes via Tier-II protocols. U.S. Testing Inc. provided analytical services for this round of samples.

Memo to the Files September 20, 1991 Page 2

A summary of the sampling and analytical method for each media: air, surface water, sediment, and ground water, is presented in the following paragraphs. Sampling locations are shown on the attached figures.

<u>Air</u>

During the first sampling event, air samples were collected from one up-wind and two down-wind locations in addition to one location at an emission point. These samples were obtained using the protocols for the collection of gaseous and particulate air samples as outlined in the NJDEP Field Sampling Procedure Manual, the NIOSH Manual of Analytical Methods (3rd. Ed., 1987) and EPA Method T01. TCL metals were captured on 0.8 micrometer cellulose acetate membrane filters (NIOSH method 7300) while TCL volatiles were captured on Tenax resin (USEPA Method T01).

Surface Water and Sediment

Eight surface water and fourteen sediment samples were obtained during the first sampling event. The location of eight of these samples followed that of the previous remedial investigation.

The samples were collected using NJDEP Field Sampling Procedures Manual (July 1986). These samples were analyzed for USEPA TCL volatiles, semi-volatiles, and selected metals.

Ground Water

Twelve ground water samples were obtained during the first round of a two round sampling events. These samples were obtained from shallow wells S-1, S-2, S-3, S-4, S-5, and S-6 and from deep wells D-1, D-2, DW-4, D-7, D-8, and D-9. The samples were collected in accordance with NJDEP Field Sampling Procedures Manual (July 1986).

Each ground water sample was analyzed for USEPA TCL volatiles, semi-volatiles and metals using CLP analytical methods. Metals analysis was conducted on both filtered and un-filtered samples. Ground water samples were also submitted for conventional pollutant analysis. Parameters considered for this class included others pH, dissolved oxygen, TDS, TSS, NH4-N, NO3-N, Coliforms, and specific ions.

Memo to the Files September 20, 1991 Page 3

Results

The results from the first round of sampling were submitted to the NJDEP for review. Based on the departments review of the data, the Division of Hazardous Site Mitigation issued comment memorandum dated November 21, 1989, December 6, 1989 and June 7, 1990. These memoranda indicated deficiencies with some of the laboratory data reporting. In response to these memoranda, O'Brien & Gere submitted revised data tables on August 29, 1991. These revised tables reflected both qualified and rejected data.

Following re-submission of the data summary tables, the NJDEP issued its final recommendations for the data on September 3, 1991. This letter advised the rejection of air monitoring results due to an absence of QA/QC data. Consequently, this data has not been provided on the sample summary tables. Additionally, the inorganics results for sample D-8 were rejected due to a lack of QA/QC data.

Summary tables which incorporate the revisions outlined in each NJDEP memorandum are provided in the following section.

/dw

Combe Fi outh Chester, New Jersey Interim Environmental Monitoring – Round I Surface Water Sampling

•	DETECT	SAMPLE	MB	W-1	МВ	W-2	мв	W-3	МВ	W-4	МВ	W-5	МВ	W-6
VOLATILE ORGANICS (ppb)	LIMIT	DATE		12/5/88		12/5/88		12/6/88		12/6/88		12/6/88		12/7/88
acetone ·	10		U	υ	U	Ū	U	U	U	U	U	U	U	12
chloroform	5		U	6	U	61	IJ	U	U	U	U	U	U	U
4-methyl-2-pentanone	10		U	U	υ.	Ü	U	U	Ü	U	U	U	U	3J
2-hexanone	10		U	U	U	Ü	U	U	U	U	U	U	U	4 J
BASE NEUTRALS (ppb)													_	_
Dilution Factor			ı	2	1	. 1	l	l	ı	1		1	1	1
di-n-butylphthalate	10		U	41	U	2JB	υ	U	U	U	U	U	U	U
bis(2-ethylhexyl)phthalate	5		U	U	U	41	U	U	U	U	U	U	U	U
di-n-octylphthalate	10		U	U	Ü	2J	U	U	U	U	U	U	U	U .
METALS (ppb)												4411		4401
aluminum				. 44U		61.6B		44U		174.8B		44Ų		44U
antimony				77.2		97.3		57.5B		33U		54.4B		45.3B
barium				73.7BJ		51.5B		11.7B		23.8B		25.0B		29.8B
beryllium				2.8B		1.5U		1.5U		1.5U		1.5U		1.5U
cadmium				5.6	,	7.2		5.9		3.5U		3.8B		3.5U
calcium				48200J		38600		10300		11240		11800		28000
соррег				9.3U		9.3U		9.3U		9.3U	ŀ	12.6B		13.7B
iron				19001		197.3		131		615.7		450		454
magnesium				202001		19300		4440B		4177B		4050B		12300
manganese				2250J	1	123		24.8		29.9		44.2		536
potassium				4920BJ		5950	ļ	1120B		1331B		1400B		3230B
sodium				43400J		34100		7110		8148		8360		22800
zinc				42.9J		2.8U	ļ	2.8U		72.7		2. 8 U	1	2. 8U

Combe Frouth
Chester, New Jersey

Interim Environmental Monitoring - Round 1 Surface Water Sampling

VO ATILE ORGANICS (ppb)		SAMPLE DATE	W-7 12/5/88	МВ	W-8 12/6/88	MB	W-DUP 12/6/88	МВ	W-MS 12/6/88	MB	W-MSDup 12/6/88
methylene chloride	5		U	U	U	U	U	U	2J	U	U
chloroform	5		5J	U	υ	U	U	U	υ	U	U
tetrachloroethene	5		51	Ú	U	U	U	U	U	U •	U
BASE NEUTRALS (ppb)					-						•
Dilution Factor			2	U	1	U	1	U		U	
acenaphthene	10		U	U	U	U	81	U		U	
METALS (ppb)											
atuminum	•	•	44U		44U		44U		44.8B		44U
antimony			90.9		49.5B		43.4B		52.2B		33.7B
barium			12.8B		16.6B		16B		16.8B		16.4B
cadmium			6.4		4.3B	•	3.7B		5.0		3.5U
calcium			18300		17200	•	17100		17000		17000
cobalt			2.8U		3.6B		2.8U		4.9B		2. 8 U
copper			9.3U		11.0B		12.2B		11.4B		9.8B
iron			98.2B		210		240		292		222
magnesium		•	8840		7850	•	7840		7750		7800
manganese			17.2		36.1		35.3		44.2		37.6
nickel			12.5B		12.4U		12.4U		12.4U		12.4U
potassium			2250B		2110B		2130B		2070B		2100B
sodium			24800		21300		21300		20800		21200
zirle			2. 8 U		2.8U	•	4.6B		4.3B		4.4B

Combe F outh
Chester, New Jersey
Interim Environmental Monitoring – Round 1
Surface Water Sampling

	SAMPLE	W-1	W-2	W-3	W-4	W-5	W-6
FILTERED METALS (ppb)	DATE	12/5/88	12/5/88	12/6/88	12/6/88	12/6/88	12/7/88
antimony		67.7	67.9	45.4B	39.8B	82.9	96.7
barium		69.2	59.2B	10.4B	26.2B	22.9B	28.9B
beryllium		2. 8B	2.8B	1.5U	1.5U	1.5U	1.5U
cadmium		5.9	5.1	5.1	3.8U	9.4	9.0
calcium		48500	38500	10100	12900	11700	28300
iron		1130	10.9B	395	287	283	97.3B
magnesium		20200	18500	4340B	4710	4120	12700
manganese		2270	8 6.5	16.2	30.2	45.7	529
potassium		4990B	5990	1100B	1460B	1330B	3130B
sodium		43800	34000	6850	8690	8230	22700
zinc		45.9	3.8B	2.8U	2. 8 U	2. 8 U	2. 8 U
INORGANICS							
На		6.83	6.97	6.98	6.94	7.05	6.93
TSS (mg/l)		9.0	< !	2.0	3.0	<1	1.0
TDS (mg/l)		413.0	300.	129	157.0	112.0	254.0
specific conductance (umhos/ci	n)	556.	460.	106.2	131.0	121.0	306.0
chloride (mg/l)		110	81.	10.1	14.9	13.1	51.8
nitrite (mg/l)		< 0.5	<0.5	< 0.5	< 0.5	< 0.5	<0.5
nitrate (mg/l)		9.8	5.3	3.4	4.7	4.3	8.7
COD (mg/l)		20.6	ND	13.9	ND -	10.0	10.0
TKN (mg/l)		< 0.28	< 0.28	0.98	< 0.14	0.77	2.1
ammonia (mg/l)	÷	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
sulfate (mg/l)		15.0	8.6	10.9	18.8	18.3	14.3
phoenhorous (mg/l)		< 0.2	< 0.2	0.37	< 0.2	< 0.2	0.62
BOD (mg/l)		<10	<10	10.	11.	<10.	<10
total coliform (mpn/100ml)		<2	93	300	80.	1600.	30
fecal coliform (mpn/100ml)		<2	<2				

Combe South Chester, New Jersey

Interim Environmental Monitoring – Round 1 Surface Water Sampling

	SAMPLE	W-7	W-8	W-DUP	W-MS	W-MSDup
FIL TERED METALS (ppb)	DATE	12/5/88	12/6/88	12/6/88	12/6/88	12/6/88
antimony	· **	75.6	109	107	110	40.1B
barium		16B	17.0B	17B	16.6B	17B
beryllium		2.8B	1.5U	1.5U	1.5U -	1.5U
cadmium		5.5	9.2	10.0	10.7	3.7B
calcium		18100	17500	17690	17300	16900
copper		9.3U	9.3U	9.3U	9.3U	14.4B
iron		37.4B	138	255.1	125	139
magnesium		8490	8100	8240	8050	8140
manganese		14.3B	26.3	39.5	25.5	25.5
potassium	•	2390B	2040B	2080B	2120B	2080B
selenium		5U	5U	7.0	14.0	19
sodium		24700	21100	21300	20800	21100
zinc		4.1B	3.0B	2.8U	2. 8 U	3.8B
INORGANICS						
р Ӈ			7.13	7.26		
TSS (mg/l)			4.0	6.0		
TDS (mg/l)			188.0	137.0		
specific conductance (umhos/cm	1)		225.0	223.		
chloride (mg/l)	•		3.8	28.9	•	
nitrite (mg/l)			2.5	< 0.5		
nitrate (mg/l)			2.6	3.7		
COD (mg/l)			13.9	17.9		
TKN (mg/l)	_		<2.14	.77		
ammonia (mg/l)	•	•	<0.1	<0.1		
sulfate (mg/l)		21.8	6.1	22.4		
phosphorous (mg/l)		< 0.2	< 0.2	<0.2		
BOD (mg/l)		54	<10	14		
total coliform (mpn/100ml)		500	900	1600		
fecal coliform (mpn/100ml)						

Notes:

U- Indicates that the compound was analyzed for but not detected.

J- The concentration listed is an estimated value.

B- Indicates that the analyte was detected in the blanks as well as the sample.

MB- Method Blank

TB- Trip Blank

mbe Fill South

.Chester, New Jersey

Interim Environmental Monitoring - Round 1

Sediment Sampling

methylene chloride	·	SAMPLE DATE	MB	WS-1 12/5/88	MB	WS-2 12/5/88	МВ	WS-3 12/6/88	MB	WS-4 12/6/88	МВ	WS-5 12/6/88	МВ	WS-6 12/6/88	МВ	WS-7 12/8/88	МВ	WS-8 12/6/88
Remyretic Enforme Color					11	711	11	611	11	71	U	8J	U	111	U	13U	U	7
BASE NEUTRALS (ppb) accnaphthene	•				1						_						U	14U
BASE NEUTRALS (ppb) acenaphthene phenanthrene authracene U 450U U 600 U 430U U 460U U 470U U 450U U 850U U 450U di-n-butylphthalate U 180U U 460U U 430U U 460U U 470U U 450U U 850U U 450U di-n-butylphthalate U 180U U 460U U 430U U 460U U 470U U 450U U 850U U 450U fluoranthene U 450U U 460 U 430U U 460U U 470U U 450U U 850U U 450U fluoranthene U 450U U 930U U 460U U 470U U 450U U 850U U 450U fluoranthene U 450U U 930U U 460U U 470U U 450U U 850U U 450U fluoranthene U 450U U 930U U 430U U 460U U 470U U 450U U 850U U 930U benzo(a)anthracene bus(2-ethylhexyl)phthalate U 230I U 320I U 340U U 460U U 470U U 450U U 850U U 930U chysene METALS aluminum 3390 11000 4820 4920 2870 5730 5920 3080 antimony 12.3 35.7 8.60U 9.1B 8.8U 16.2 16.7 10.5B aluminum 17.8B 131 36.9B 36.5B 28.3B 62.9 64.3 35.6B barium 17.8B 131 36.9B 36.5B 28.3B 62.9 64.3 35.6B barium 17.8B 131 36.9B 36.5B 28.3B 62.9 64.3 35.6B barium 17.8B 131 36.9B 36.5B 28.3B 62.9 64.3 35.6B barium 17.8B 131 36.9B 36.5B 28.3B 62.9 64.3 35.6B barium 18.1 15.0 1.2B .4U .41U .4U .4U .1.5U .4U beryllium 1.5U .1.5U .1.2B .4U .41U .4U .4U .1.5U .4U beryllium 1.5U .1.3B .17U .1.8B aluminum 3880 49400 16500 16500 7740 17700 9110 1400 aluminum 3880 49400 16500 16500 7740 17700 9110 1400 anagenesium 385B 24000 603B 579B 290B 1150 1170 1380 anagenesium 385B 24000 603B 579B 290B 1150 1170 1380 anagenesium 385B 24000 603B 579B 290B 1150 1170 1380 anagenesium 299B 388.7B 540B 291B 200B 488B 402B 482B anagenesium 299B 388.7B 540B 291B 200B 488B 402B 482B anagenesium 299B 388.7B 540B 291B 200B 488B 402B 482B anagenesium 299B 388.7B 540B 291B 200B 488B 402B 482B anagenesium 299B 388.7B 540B 291B 200B 488B 402B 482B anagenesium 299B 388.7B 540B 291B 200B 488B 402B 482B anagenesium 299B 388.7B 241B 211B 1758 515B 177B anagenesium 299B 388.7B 215B 160B 291B 200B 489B 402B 482B anagenesium 299B 388.7B 215B 160B 291B 200B 489B 402B 482B anagenesium 299B 388.7B 215B 160B 291B 200B 489B 402B 402B 482B anagenesium 299B 388.7B 215B 160B 291B 200B 489B 402B 402B 482B anagenesium 299B 388.7B 21					_										U	13U	U	7 U
Accept U 450U	Chlorotorm			.,	U	.,						Ť	1		1			
Accept U 450U	BASE NEUTRALS (ppb)																	. = =
phenanthrene			U	450U	U	46J	U	430U	U		U							
Anthracene			U	450U	U	600	U		U		_						l .	
New York Continue	•		U	450U	U	140J	U	430U	U		1		r e		1			
Riveranthene	di-n-butylphthalate	:	U	1.80J	U	46J	U										_	
Demonal Color			U		U				_				_		1		_	
Description	pyrene		U		U		_		_								_	
METALS					U		-										-	
METALS aluminum antimony 12.3 35.7 8.6U 9.1B 8.8U 16.2 16.7 10.5B arsenic 1.3U 20.1 1.9B 1.3U 1.3U 1.3B 1.7U 1.8B barium 17.8B 131 36.9B 36.5B 28.3B 62.9 64.3 35.6B beryllium cadmium 2.93U 6.1 91U 96U 93U 1.3 2.4 92B calcium calcium 4.3 15.6 3.5 6.2 2.1 33.6 11.3 6.4 chromium 4.3 15.6 3.5 6.2 2.1 33.6 11.3 6.4 cobalt copper 3 3B 16.8 4.6B 4.5B 1.7B 10.4 4.6B 5B copper 4 2.5U 2.6U 2.4U 4.5B 2.5U 2.5U 3.4U 6.5 iron 8 080 49400 16500 7740 17700 9110 14600 lead 18.1 16.1 20.5 17.4 16.8 11.9 1.8 14.5 magnesium manganese 1 256 3040 381 422 183 1900 632 531 manganese 1 256 3040 381 422 183 1900 632 531 manganese 1 256 3040 381 422 183 1900 632 531 manganese 1 238 736B 3.2U 3.4B 4.8B 4.3B 9.3 9.4 por ssium soutum 2 299B 388.7B 215B 164B 211B 175B 515B 177B soutum vanadium 2 299B 388.7B 215B 164B 211B 175B 515B 177B vanadium 2 299B 388.7B 215B 164B 211B 175B 515B 121B 121B 175B 515B 177B vanadium 2 299B 388.7B 215B 164B 211B 175	bis(2-ethylhexyl)phthalate				_								_		_			
aluminum 3390 11000 4820 4920 2870 5730 5920 3080 antimony 12.3 35.7 8.6U 9.1B 8.8U 16.2 16.7 10.5B arsenic 1.3U 1.3U 1.3U 1.3B 1.7U 1.8B barium 17.8B 131 36.9B 36.5B 28.3B 62.9 64.3 35.6B beryllium 1.5U 1.2B .4U .41U .4U	chrysene		U	450U	U	930	U	430U	บ	460U	լս	470U	ן ט	450U	יין	8200	۱ ۲	4500
aluminum 3390 11000 4820 4920 2870 5730 5920 3080 antimony 12.3 35.7 8.6U 9.1B 8.8U 16.2 16.7 10.5B arsenic 1.3U 1.3U 1.3U 1.3U 1.3B 1.7U 1.8B barrium 17.8B 131 36.9B 36.5B 28.3B 62.9 64.3 35.6B beryllium 1.5U 1.2B .4U .41U .4U	145m 11.0												1		l			
antimony arsenic land land land land land land land land	•			2200		11000		4920		1020		2870		5730	1	5920		3080
antmony arsenic							ļ								1			10.5B
17.8B															1			1.8B
beryllium cadmium caduium cadmium cadmium cadmium cadmium cadmium cadmium cadmium caduium caduium caduium caduium caduium caduiu cadui cadui cadui cadu cadui cadu cadui c							l				•		ł					35.6B
Color Colo							ł				1					1.5U	Į.	.4U
calcium 613B 3370 806B 784B 541B 1290 2580 1440 chromium 4.3 15.6 3.5 6.2 2.1 33.6 11.3 6.4 cobalt 3B 16.8 4.6B 4.5B 1.7B 10.4 4.6B 5B copper 2.5U 2.6U 2.4U 4.5B 2.5U 2.5U 3.4U 6.5 iron 8080 49400 16500 16500 7740 17700 9110 14600 lead 18.1 16.1 20.5 17.4 16.8 11.9 1.8 14.5 magnesium 385B 2400 603B 579B 290B 1150 1170 1380 manganese 256 3040 381 422 183 1900 632 531 nickel 3.3B 5.6B 3.2U 3.4B 4.8B 4.3B 9.3 9.4 po' ssium 299B 388.7B	· · · · · · · · · · · · · · · · · · ·																	.92B
Chromium chromium chromium chromium cobalt 4.3 15.6 3.5 6.2 2.1 33.6 11.3 6.4 cobalt copper 2.5U 2.6U 2.4U 4.5B 1.7B 10.4 4.6B 5B copper 2.5U 2.6U 2.4U 4.5B 2.5U 2.5U 3.4U 6.5 iron 8080 49400 16500 16500 7740 17700 9110 14600 lead 18.1 16.1 20.5 17.4 16.8 11.9 1.8 14.5 magnesium manganese 385B 2400 603B 579B 290B 1150 1170 1380 mickel 3.3B 5.6B 3.2U 3.4B 4.8B 4.3B 9.3 9.4 po' ssium 233B 736B 540B 291B 200B 489B 402B 482B sodium 299B 388.7B 215B 164B 211B 175B 515B 177B v											ļ		1			2580		1440
cobalt 3B 16.8 4.6B 4.5B 1.7B 10.4 4.6B 5B copper 2.5U 2.6U 2.4U 4.5B 2.5U 2.5U 3.4U 6.5 iron 8080 49400 16500 16500 7740 17700 9110 14600 lead 18.1 16.1 20.5 17.4 16.8 11.9 1.8 14.5 magnesium 385B 2400 603B 579B 290B 1150 1170 1380 mickel 3.3B 5.6B 3.2U 3.4B 4.8B 4.3B 9.3 9.4 po' ssium 233B 736B 540B 291B 200B 489B 402B 482B sodium 299B 388.7B 215B 164B 211B 175B 515B 177B vanadium 8.0B 65.5 10.7 10.7 3.5B 29.6 11.9 12.2											1]	33.6	1	11.3		
copper 2.5U 2.6U 2.4U 4.5B 2.5U 2.5U 3.4U 6.5 iron 8080 49400 16500 16500 7740 17700 9110 14600 lead 18.1 16.1 20.5 17.4 16.8 11.9 1.8 14.5 magnesium 385B 2400 603B 579B 290B 1150 1170 1380 manganese 256 3040 381 422 183 1900 632 531 nickel 3.3B 5.6B 3.2U 3.4B 4.8B 4.3B 9.3 9.4 po' ssium 233B 736B 540B 291B 200B 489B 402B 482B sodium 299B 388.7B 215B 164B 211B 175B 515B 177B vanadium 8.0B 65.5 10.7 10.7 3.5B 29.6 11.9 12.1 56.7							ľ						l	10.4	1	4.6B		
Solution Solution									1					2.5U	1	3.4U	l	
18.1 16.1 20.5 17.4 16.8 11.9 1.8 14.5 1380 1380 14.5 1			1							16500		7740		17700	1		1	
magnesium manganese manganese manganese 385B 2400 381 381 422 183 1900 632 531 183 1900 632 531 183 1900 632 531 183 1900 632 531 183 1900 632 531 183 1900 632 531 183 1900 632 531 183 1900 632 632 631 183 1900 632 631 183 1900 632 631 183 1900 632 631 1900 632 631 1900 632 632 631 1900 63			l							17.4		16.8	l	11.9	ļ		ŀ	
manganese manganese nickel 256 3040 381 422 183 1900 632 531 nickel po' ssium sodium 233B 736B 540B 291B 200B 489B 402B 482B vanadium 299B 388.7B 215B 164B 211B 175B 515B 177B vanadium 8.0B 65.5 10.7 10.7 3.5B 29.6 11.9 12.2 72 8 121 56.7								603B	l	579B		290B	ł		Į.			
3.3B 5.6B 3.2U 3.4B 4.8B 4.3B 9.3 9.4	•		ŀ				1			422	i	183						
po' ssium 233B 736B 540B 291B 200B 489B 402B 482B sodium 299B 388.7B 215B 164B 211B 175B 515B 177B vanadium 8.0B 65.5 10.7 10.7 3.5B 29.6 11.9 12.2 66.7 10.7 10.7 3.5B 29.6 11.9 12.2 70.8 12.1 56.7							ĺ	3.2U	ļ	3.4B		4.8B	ł				ļ	
299B 388.7B 215B 164B 211B 175B 515B 177B 10.7 3.5B 29.6 11.9 12.2 12.1 12.2					Ì		1	540B		291B			1				1	
vanadium - 8.0B 65.5 10.7 10.7 3.5B 29.6 11.9 12.2								215B	l	164B								
00.0 00.	=							10.7	1				1				1	
ZINC TALL TALL TO SEE THE SECOND SECO	zinc			41.1		137		90.8		86.3		97.9		72.8		121		56.7

mbe Fill South

Chester, New Jersey

Interim Environmental Monitoring – Round 1 Sediment Sampling

SAMPLI	Е МВ	WS-9
VOL. TILE ORGANICS (ppb) DATE	•	12/2/88
methylene chloride	U	7บ
acetone	U	14U
chloroform	U	7 U
BASE NEUTRALS (ppb)		
acenaphthene	U	460U
phenanthrene	U	460Ü
anthracene	U	460U
di-n-butylphthalate	U	93J
fluoranthene	U	460U
ругене	U	460U
benzo(a)anthracene	U	460U
bis(2-ethylhexyl)phthalate	U	460U
chrysene	U	460U
METALS		
atuminum		4122
antimony		19.61
arsenic		1,4U
barium		71.21
beryllium		1.2BJ
cadmium		1.7
calcium		61701
chromium		8.4J
cobalt		10.61
copper		2.6U
iron		28500J
lead		82.8J
magnesium		3940
manganese		3942J
nickel		4.5BJ
potassium		4.5J
sodium		2491
vanadium		24.4J
zinc		103.9J

mbe Fill South

Chester, New Jersey

Interim Environmental Monitoring - Round 1

Sediment Sampling

		i		•								1	i	i		l	
	SAMPLE	MB	WS-10	MB	WS-11	MB	WS-12	MB	WS-13	MB	WS-14	MB	WS-DUP	MB	WS-MS	мв ч	WS-MSDUP
	DATE		12/2/88		12/2/88	 	12/2/88	·	12/2/88		12/2/88		12/6/88		12/6/88		12/6/88
VOLATILE ORGANICS (ppb)		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
		l								l			•				
BASE NEUTRALS (ppb)								;									
phenanthrene		U	440U	U	460U	U	2800U	U	460U	U	440U	U	44J				
fluoranthene		U	440U	υ	460U	υ	2800U	U	460U	U	440U	U	443				
pyrene		U	440U	U	460U	U	2800U	U	460U	U	440U	U	130J				
bis(2-ethylhexyl)phthalate		U	440U	U	460U	υ	2800U	U	460U	U	440U	U	440		!		
METALS (ppm)													-				
Aluminum										1			4410		7160		4640
Antimony	•		13.3B		17.7		399.4		17.4	1	14.6		10.1B		14.1		15.9
Arsenic			1.3U		1.3U		28.2U		1.2U	1	1.3Ü		2.0		2.2		1.9B
Barium		'						1		1			47.3		68.9	•	49.6
Beryllium			.6B		.5B		8.8U		7B	1	.5B		.4U		.41U		.39U
Cadmium		ł	. 9U		1.6		26.5B		1.4		1.2B		1.0B		1.5		1.1
Calcium		1	3710		812B		29800		498B	ļ	548B	l	1810		3670		1610
Chromium		İ	5.9		3.3		30.6	<u>'</u>	4.1		3.1		9.1		13.6	1	11.2
Cobalt		1					•			1			7.0B		10.1	1	6.9B
Copper			2.5U		2.6U		72.4		9.8		3.4B		4.7B		2.5U		4.1B
iron			11300		11500		405000		8510	ł	5260	ļ	23600		26300		17300
Lead	_		14.5		13.5		35.9		3.6		7.8		18.2		17.8	ł	17.2
Magnesiu m	•		2050		295B		7010		419B		261B		1460		3290		1730
Manganese		1						l .					660		1030		726
Mercury								· •	-	ŀ		ļ.	.14U		.14U	ŀ	.13U
Nickel			12		8,5		319		8.9	ŀ	5.7B		4.1B	١.	5.1B		13.4
Potassium													448B		1010	ŀ	696B
Silver			1.8U		1.90	1	39.4U		2.1B		1.9U		2. 0 U	1	1.8U	l	1.8U
Sodium							•						259.3B		312B	l	202B
Vanadium						1					•		22.0	ŀ	22.8		19.4
Zir -			41.9		47.6		515.9		24,2	1	35.0	1	65.6		85.6		83.3

Notes:

MB- Method Blank

TB- Trip Blank

U- Indicates that the compound was analyzed for but not detected.

J- The concentration listed is an estimated value.

B- Indicates that the analyte was detected in the blanks as well as the sample,

VOLATILE ORGANICS (ppb)	DETECT SAMPLE LIMIT DATE	MB	S-1 12/7/88	MB	ТВ	S-2- 12/14/88	МВ	ТВ	S-3 12/9/88	МВ	TB	S-4 12/12/88
chloroethane	10	U	U	U	U	U	U	U	U	U	U	19
methylene chloride	5	U	31	U	21	U	3J	U	υ	U	U	21
acetone	10	U	240	U	U	15	8J	8JB	υ	10	U	U
carbon disulfide	5	U	3J	U	. U	υ	U	U	U	U	U	Ü
chloroform	5	U	U	υ·	U	U	U	U	U	U	U	U
benzene	5	U	44	U	U	U	U	U	U J	U	U	2 J
4-methyl-2-pentanone	10	U	32	U ·	U	υ	U	U	U	U	U	Ü
2-hexanone	10	U	6J	υ.	U	53	U	U	U	U	U	9J
toluene	5	U	130	U	U	υ	U	U	U	U	U	U
chlorobenzene	5	U	27	U	U	24	U	U	υ	U	U	29
ethylbenzene	5	U	12	U	υ	U	U	U	U	U	U	U
total xylenes	5	υ	33	U.	U	U	U	Ü	υ	U	U	U
BASE NEUTRALS (ppb)									:			
1,4-dichlorobenzene	10	U,	υ	U .		21	U		υ	U		υ
1,2-dichlorobenzene	10	υ	U	Ú		51	U		U	· U		U
bis(2-chloroisopropyl)ether	10	Ü	U	U		U	U		IJ	U		U
diethylphthalate	10	υ	2J	U		U	U		υ	U	•	U
bis(2-ethylhexyl)phthalate	10	Ü	บุ	U	•	U	U		16	U		Ü

	DETECT SAMPLE	MB	TB	S-5	MB	TB	S-6	MB	TB	S-DUP
VOLATILE ORGANICS (ppb)	LIMIT DATE			12/15/88			12/14/88	·		12/14/88
chloroethane	10	U	n.	U	U	U	υ	U	U	U
methylene chloride	.5	U	ij	IJB	U	21	U	U	2 J	บ
acetone	10	U	18	U	U	U	U	U	U	U
carbon disulfide	5	U	U	U	U	U	Ü	U	U	U
chloroform	5	U	U	120	U	U	U	U	U	U
benzene	5	U	U	U	·U	U	U	U	U	U
4-methyl-2-pentanone	10	U	U	U	U	U	U	U	U	U
2-hexanone	10	U	U	U	U	U	U	U	U	U
toluene	5	U	U	υ	. n	U	U	U	U	U
chlorobenzene	5	U	U	υ	, N	U	U	Ü	U	U
ethylbenzene	5	U	U	U	U	U	U	U	U	U
total xylenes	5	U	U	U	U	U	U	U	U	U
BASE NEUTRALS (ppb)				1						
1,4-dichlorobenzene	10	U		U	U		U	U		υ
1,2-dichlorobenzene	10	U		U	U		υ	U		Ú
bis(2-chloroisopropyl)ether	. 10	U		υ	Ü		U	U		. บ
diethylphthalate	10	U		υ	U		U	U		U
b (2-ethylhexyl)phthalate	10	U		51	U		6J	U		6J

VOLATILE ORGANICS (ppb)	DETECT LIMIT	SAMPLE DATE	МВ	ТВ	S-MS 12/14/88	MB	ТВ	S-MSDUP 12/14/88
chloroethane	10		U	U	U	U	U	υ
methylene chloride	5		U	2J	U,	U	2J	U
acelone	10		U	U	υ	Ü	U	U
carbon disulfide	5		U	U	υ	U	U	U
chloroform	5	, '	U	U	U	. U	U	U
benzene	5		U	U	Ú	. U	U	U
4-methyl-2-pentanone	10		U	บ	Ü	U	U	U
2-hexanone	10		U	IJ	U	Ü	U	U
toluene	5		U	U	. U	U	U	U
chlorobenzene	5		U	U	U '	U	U	U
ethylbenzene	5		U	U	U	U	U	U
total xylenes	5		U	U	U	U	U	U
BASE NEUTRALS (ppb)								
1,4-dichlorobenzene	10		U		U	U		U
1,2-dichlorobenzene	10		U		U	υ,		U
bis(2-chloroisopropyl)ether	10		U		U	υ		U
diethylphthalate	10		U		U	U	•	U
bis(2-ethylhexyl)phthalate	10		υ		U	U		93

	S-1	S-2	S-3	S-4	S-5	S-6	S-DUP	S-MS	S-MSDUP
METALS (ppb)	12/7/88	12/14/88	12/9/88	12/12/88	12/15/88	12/14/88	12/14/88	12/14/88	12/14/88
aluminum	2350	300	1910	9090	211	9100	9410	109B	44U
antimony	33U	33U	141J	77.5	69.6	33U	33U	40.9B	36.8B
arsenic	4.8U	4.8U	4.8UJ	5.0B	4.8U	4.8U	4.8U	4.8U	4.8U
barium	298	186B	302J	153B	17.3B	72.1B	73.2B	18.7B	19B
beryllium	1.5U	1.5U	4.4BJ	4.2B	3.2B	1.5U	1.9B	1.5U	1.5U
cadmium	3.5U	3.5U	12.1	7.8	7.6	3.5U	3.5U	5.9	3.5U
calcium	215000	40000	366000J	206000	6380	- 3820B	3920B	3670B	3440B
chromium	23.6	16.9	36.1J	41.3	8B	18.2	23.8	5.2U	5.2U
cobalt	59.7	70.2	165	29.7B	3.5B	3.9B	2.8B	2. 8U	2. 8 U
copper	20B	9.3U	9.3U	9.3U	9.3U	9.3U	9.3U	24.1B	9.3U
iron	77400	68300	54800	22200	613	6380	6700	72.5B	21.3B
lead _	10	69.5	5UJ	13.5	17.7	11.2	53.4	5.0U	5U
magnesium	103000	13100	120000	70000	2340B	2020B	1990B	1220B	1160B
manganese	8770	5920	66400	20000	27.2	43.0	46.8	16.3	16.3
nickel	12.4U	25.1B	19.4BJ	25.2B	12.4U	12.4U	12.4U	12.4U	12.4U
potassium	5530	4860B	7950	6900	1220B	1620B	1610B	1010B	1030B
silver	6.7U	6.7U	6.7U	6.7U	7.7B	6.7U	6.7U	6.7U	6.7U
socium	50200	43100	1270001	159000	7320	5060	4850B	4460B	4400B
vanadium	4.5U	4.5U	4.5U	4.5U	4.5U	13.6B	15B	4.5U	4.5U
zinc	56.7	242	10500J	131	57.8	49.4	106	50.8	72.1

	S-1	S-2	S-3	S-4	S-5,	S-6	S-DUP	S-MS	S-MSDUP
FILTERED METALS (ppb)	12/7/88	12/14/88	12/9/88	12/12/88	12/15/88	12/14/88	12/14/88	12/14/88	12/14/88
aluminum	46.5B	284	53.2B	44U	44U	44U	44U	44U	44U
antimony	33U	33U	135	90.1	135	33U	33 U	33U	33U
barium	324	184B	292	131B	10.6B	14.7B	15.2B	14.8B	14.4B
beryllium	1.5U	1.5U	5.3	3.7B	1.5U	1.5Ú	1.5U	1.5U	1.5U
cadmium	3.5U	3.5U	11.2	9.1	13.7	3.5U	3.5U	3.5U	3.5U
calcium	226000	44900	365000	217000	6580	3370	3290B	3190B	3180B
chromium	5.2U	5.2U	18.4	7.6B	5.2U	5.2U	5.2U	5.2U	5.2U
cobalt	35.3B	78.6	161	29.8B	2.8U	2.8U	2.8U	2.8U	2. 8 U
iron	84900	70500	49400	7970	35.7B	98.8B	12,7B	4.8U	4.8U
lead	5.9	67.9	5 U	. 5U	5U	16.9	55.2	. 5 U	5Ü
magnesium	113000	15200	120000	73700	2280B	1220B	1170B	1160B	1170B
manganese	9110	6700	66200	21500	16.2	21.6	16.2	13.8B	14.7B
nickel	12.4U	12.4U	19B	12.4U	12.4U	12.4U	12.4U	12.4U	12.4U
potassium	5590	5250	6470	6290	1140B	1100B	1010B	1060B	1060B
sodium	53000	49000	66600	167000	7460	4510B	4430B	4370B	4390B
zinc	193	243	9740	38.9	43.0	64.1	39.6	46.3	68.1

	S-1	S-2	S-3	S-4	S-5	S-6	S-DUP	S-MS	S-MSDUP 12/14/88
INORGANICS	12/7/88	12/14/88	12/9/88	12/12/88			12/14/88	12/14/88	
pН	6.40	6.34	6.08	6.59	7.93	6.98	6.45	6.79	6.81
TSS (mg/l)	217.0	85.0	99.0	153.0	16.0	84.0	140.0	40.0	46.0
TDS (mg/l)	1454.0	271.0	2396.0	1602.2	ND ·	125.0	3.0	69.0	57.0
specific conductance (umhos/cm)	1852.	2130.	1741.0	2060	80.8	39.5	38.6	37.4	37.1
chloride (mg/l)	298.0	46.9	607.	548.	4.4	43	4.8	3.0	2.6
nitrite (mg/l)	< 0.5	<0.5	< 0.5	< 0.5	<0.5	<0.5	< 0.5	< 0.5	<0.5
nitrate (mg/l)	2.4	0.51	3.1	4.4	2.4	1.1	1.3	1.2	1.1
COD (mg/l)	113.2	29.8	863.8	138.8	15.7	11.9	ND	4	4
TKN (mg/l)	2.17	< 0.14	< 0.28	< 0.28	<0.14	< 0.14	<0.14	< 0.14	< 0.14
ammonia (mg/l)	<0.1	<0.1	<0. i	<0.1	<0.1	<0.1	<0.1	< 0.1	<0.1
sulfate (mg/l)	1.3	45.1	6.3	4.7	2.6	1.5	2.9	1.4	1.2
phosphorous (mg/l)	0.96	2.27	1.67	0.27	0.55	0.36	< 0.2	1.89	2,33
BOD (mg/l)	64	18.	530.	<10	<10	<10	10	11	<10
total coliform bacteria (mpn/100ml)	<2	<2	<2	<2	<2	· <2	<2	11	23

Notes:

U- Indicates that the compound was analyzed for but not detected above limit.

J- Indicates an estimated value.

B- Indicates analyte was detected in blanks as well as the sample.

NA- Not Analyzed

MB- Method Blank

TB- Trip Blank

	DETECT	SAMPLE	MB	TB	D-1	MB	TB	D-2	MB	TB	DW-4
VOLATILE ORGANICS (ppb)	LIMIT	DATE			12/14/88			12/15/88			1/10/88
chloroethane .	10		U	U	U	U	U	U	U	U	U
methylene chloride	5		U	2J	Ü	U	IJ	118	U	3J	3JB
acetone	10		U	U	Ú	U	18	59B	ប	U	14
trans-1,2-dichloroethene	5		, U	Ú	U	U	U	U	บ	U	3 J
chloroform	5		U	U	U	U	·U	61	U	U	80
benzene	5		U	U	U	U	U	11	U	U	U
4-methyl-2-pentanone	10		U	U	U	U	U	U	U	U	U
2-hexanone	10		U	U	· 13	U	U	U	U	U	U
chlorobenzene	5		U	U.	. u	U	U	U	U	U	U
ethylbenzene	5		U	U	U	U	U	U	U	U	U
BASE NEUTRALS (ppb)											
1,4-dichlorobenzene	10		U		U	U	_	U ·	U		U
naphthalene	. 10		Ú		Ü	U		U	U		U
di-n-butylphthalate	10		U		Ü	U		U	U		1.1
bis(2-ethylhexyl)phthalate	5		U		U	U.		2յ	U		66

VOLATILE ORGANICS (ppb)	DETECT LIMIT	SAMPLE DATE	MB	ТВ	D-7 12/15/88	МВ	ТВ	D-8 12/13/88	МВ	ТВ	D-9 12/9/88
chloroethane	10		U	U .	U	U	U	11	U	U	U
methylene chloride	5		U	IJ	. IJB	U	2 J	U	31	U	2JB
acetone	10	<u> </u>	U	18	13JB	U	U	U	8J	8JB	U
trans-1,2-dichloroethene	.5		U	U .	. υ	Ų	Ü	U	U	U	U
chloroform	5		U	υ	U	U	U	Ü	U	U	U
benzene	5		U	U	U	Ü	U	U	U	U	U
4-methyl-2-pentanone	10		U	U	υ	U	U	23	U	U	U
2-hexanone	10		บ	U	41	U	U	53	U	U	U
chlorobenzene	5		U	ບ່	υ	U	U	υ	Ú	U	9
ethylbenzene	5		U	U	IJ	U	U	U	U	U	. U
BASE NEUTRALS (ppb)		; ;									
1,4-dichlorobenzene	10		U		υ	Ü		υ	U		U
naphthalene	10		U		υ	U		2J	υ		U
di-n-butylphthalate	10	}	U		U	U		U	15		U
bis(2-ethylhexyl)phthalate	5		U		. 5	U		U	U		34

VOLATILE ORGANICS (ppb)	DETECT LIMIT	SAMPLE DATE	МВ	ТВ	D-DUP 12/13/88	МВ	TB.	D-MS 12/13/88	МВ	ТВ	D-MSDUP 12/13/88
chloroethane	10		Ü	U	11	U	U	12	U	U	11
methylene chloride	5	-	U	21	U	Ü	2 J	U	U	2 J	U
acetone	10		U	U	U	U	· U	U	U	U	U
trans-1,2-dichloroethene	· 5		U	U	. U	υ	U	U	U	U	U
chloroform	5		U	U	U	U	U	U	U	U	U
benzene	5		U	U.	U	U	U	U	U	U	U
4-methyl-2-pentanone	10		U	U	IJ	U	U	U	U	U	IJ
2-hexanone	10		U	U	3J	U	Ú	6J	U	υ	43
chlorobenzene	5		U	U	U	U	U	31	U	U	U
ethylbenzene	5		U	U	Ü	U	U	U	U	U	U
BASE NEUTRALS (ppb)											
1,4-dichlorobenzene	10		Ú		6J	U		U	U		U
naphthalene	10		U		31	U		U	U		3J
di-n-butylphthalate	10		U		U	U		บ	Ú		U
bis(2-ethylhexyl)phthalate	5		U		U	U		υ	U		U

				,						
	SAMPLE	D-1	D-2	DW-4	D-7	D-8	D-9	D-DUP	D-MS	D-MSDUP
METALS (ppb)	DATE	12/14/88	12/15/88	1/10/89	12/15/88	12/13/88	12/9/88	12/13/88	12/13/88	12/13/88
aluminum		44U	44U	237	298	R	185B	97.7B	44U	44U
antimony		118	74.4	97	33U	R	112	88.2	83.6	87.7
arsenic		4.8U	83.7	4.8U	4.8U	R	4.8U	4.8U	4. 8 U	4.8U
barium		8.0B	11.5B	26.6B	858	R	75.7B	294	232	217
berryllium		1.5U	3.2B	1.50	2.7B	R	2.4B	3.2B	1.5U	1.5U
cadmium		12.0	7.3	7	7.0	R	9.6	9.2	9.8	9.0
calcium		10800	40800	27900	359000	R	205000	255000	256000	236000
chromium		5.2U	5.2U	10.4	25.2	·R	7B	8.4B	5.2U	5.2U
cobalt		2. 8 U	3.1B	2. 8U	47.8B	R	15B	35.6B	17.6B	20.9B
copper		9.3U	9.3U	39.5	9.3U	R	9.3U	9.3U	9.3U	9.3U
iron		4.8U	198	41300	33200	R	3890	24900	23300	22200
lead	•	5.0U	5Ú -	13.7	13.6	R	15	5.0U	5.0U	5.0U
magnesium		4010B	11900	15800	179000	R	94800	89900	90100	83300
manganese		6.9B	40.7	1040	4350	R	7490	10900	10900	10100
nickel		12.4U	12.4U	22.6B	71.4	R	12.4U	12.4U	12.4U	12.4U
potassium	•	928B	2600B	2420B	11900	R	5590	8750	8670	8070
silver		16.6	6.7U	6.7U	· 6.7U	R	6.7U	6.7U	6.7U	6.7U
sodium		4590B	18000	9730	294000	R	91000	234000	236000	219000
zinc		5.3B	189	139	167	R	73.6	52.8	31	32.2

Combe Fill South
Chester, New Jersey
Interim Environmental Monitoring – Round 1
Deep Well Sampling

FILTERED METALS (ppb)	D-1 12/14/88	D-2 12/15/88	DW-4 1/10/89	D-7 12/15/88	D-8 12/13/88	D-9 12/9/88	D-DUP 12/13/88	D-MS 12/13/88	D-MSDUP 12/13/88
aluminum	44U	44U	44U	131B	R	44U	44U	44U	44Ü
antimony	33U	111	125	51.1B	R	109	33U	33U	33U
- barium	6.4B	9.5B	8.7B	729	R	71.8B	200	198B	200B
beryllium	1.5U	1.5U	2.4B	1.5U	R	1.9B	1.5U	1.5U	1.5U
cadmium	3.5U	11.1	10.9	11.8	R	9.1	3.5U	3.5U	3,5U
ealeium •	11300	40500	19200	352000	R	201000	256000	259000	263000
chromium	5.2U	5.2U	5.2U	7.4B	R	5.2U	5.2U	5.2U	5.2U
cobalt	2. 8 U	2. 8 U	2. 8U	47.1B	R	15.2B	17.7B	16.8B	17.1B
iron	4.8U	166	7480	13200	R	1930	22100	20900	21800
lead	5.0U	5U	5U· -	6.2	R	5U	5 U	5U	5 U
magnesium	4460B	11900	10800	177000	R	94600	89000	90000	91200
manganese	4.9B	37	561	4120	R	7460	10700	10800	10900
nickel	12.4U	12.4U	12.4U	57.2	R	12.4U	12.4U	12.4U	12.4U
polassium	1140B	2480B	1640B	11700	R	5540	8290	8260	8230
selenium	5 U	5U	5 U	. 6	R	5U	5U	5U	5U
sodium	5400	18000	7070	291000	R	91200	233000	235000	234000
zine	18.1B	186	9.8B	78	R	85.3	20.4	19.6B	19.1B

INORGANICS	D-1 12/14/88	D-2 12/15/88	DW-4 1/10/89	D-7 12/15/88	D-8 12/13/88	D-9 12/9/88	D-DUP 12/13/88	D-MS 12/13/88	D-MSDUP 12/13/88
pH .	7.17	8.53	6.92	8.12	6.65	6.88	6.70	6.74	6.78
TSS (mg/l)	12.0	2.0	31.0	55.0	46.0	16.0	64.0	46.0	17.0
TDS (mg/l)	309.0	199.0	161.0	2914.0	1798.0	1433.0	1786.0	1789.0	1798.0
specific conductance (umhos/cm)	101	336.0	242.0	3630.0	2260	2730	2280	2280	2300
chloride (mg/l)	4.6	27.6	9.2	1017	614	570	605	631	641
nitrite (mg/l)	<0.5	< 0.5	< 0.5	<0.5	< 0.5	<0.5	< 0.5	< 0.5	< 0.5
nitrate (mg/l)	0.36	0.77	1.1	9.6	5.5	6.7	5.6	5.6	5.6
COD (mg/l)	4	6.8	54.9	305.9	166.6	94.5	164.7	4,	168.6
TKN (mg/l)	< 0.14	<0.14	< 0.14	< 0.14	<0.14	< 0.28	<0.14	0.14	<0.14
ammonia (mg/l)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
sulfate (mg/l)	9.2	2.5	1.5	6.8	3.8	2.8	3.8	3.8	5.3
phosphorous (mg/l)	<0.2	0.54	<0.2	5.1	0.49	0.61	0.26	< 0.2	0.73
BOD (mg/l)	<10	<10	10</td <td>10</td> <td>28</td> <td><10</td> <td>33</td> <td>33</td> <td>22</td>	10	28	<10	33	33	22
total coliform bacteria (mpn/100ml)	<2	<2	<2	<2	23	<2	2	30	13

Notes:

U- Indicates that the compound was analyzed for but not detected.

J- Indicates an estimated value.

B- Indicates analyte was detected in the blanks as well as the sample.

MB- Method Blank

TB- Trip Blank

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Combe Fin South Chester, New Jersey Interim Environmental Monitoring – Round I Field Blank Samples

	SAMPLE			FB-3			FB-4			FB-5			FB-6
VOLATILE ORGANICS (ppb)	DATE	МВ	TB	12/12/88	MB	TB	12/13/88	MB	ТВ	12/14/88	МВ	ТВ	12/15/88
		ŀ										4.	
methylene chloride		U	U	2J	U	2 J	. U	U	21	U	U	13	11
acetone		10	Ų	U	Ü	U	U	υ	U	U	U	18	240
chloroform		υ	U	U	U	U	5	υ	U	U	บ	u	· U
BASE NEUTRALS (ppb)								,					
Di-N-Butal phthalate	,	U	U	บ	U	U	U	U.	U	U	U	U	U
bis(2-ethylhexyl)phthalate		ย	U	U	U	U ·	U	U	U	U	t U	U	U

Combe Filt South Chester, New Jersey Interim Environmental Monitoring - Round 1 Field Blank Samples

	SAMPLE	мв	TB	FB	МВ	TB	FB-,10	МВ	TB	GW-2-FB	MB	ТВ	W-FB-14-30
VOLATILE ORGANICS (ppb)	DATE			12/9/88			1/10/89	<u> </u>		12/8/88			12/5/88
				•		•		ľ					
methylene chloride		U	U	U	U -	31	31	3)	U	U	U	U	2Ј
acetone		U	U	u	υ	U	6	8J	8JB	30B	U	Ü	33 -
chloroform		U	U	7	' U	U	U	Ü	U	U	U	U	U
BASE NEUTRALS (ppb)						•					•		
Di-N-Butal phthalate		4J(67J)	U	U	u	ń	IJ	υ	U	U	U	U	U
bis(2-ethyllicxyl)phthalate	٠	U	U	U	U	U	39	U	U	U	U	U	U

Combe Fitt South Chester, New Jersey Interim Environmental Monitoring – Round 1 Field Blank Samples

VOLATILE ORGANICS (ppb)	SAMPLE DATE	МВ	TB	W-FB-3-15 12/5/88	МВ	ТВ	W-FB-21-00 12/5/88	МВ	TB	WS-FB 12/16/88	МВ	ТВ	WS-FB 12/10/88
methylene chloride acetone chloroform		U U U	U U U	7 U 4J	บ บ บ	บ บ . ย	IJ . 14 . U	บ บ บ	บ บ บ	บ บ บ	U . U . U	บ บ บ	U U 6
BAȘE NEUTRALS (ppb)	·				•	•							
Di-N-Butal phthulate		U	U	U	Ü	υ	U	U	U	U	4J(67J)	U	U
bis(2-ethylhexyl)phthalate		U	U	U	U	U	U	U	U	Ü	U	U	U

Combe Filt South Chester, New Jersey Interim Environmental Monitoring – Round 1 Field Blank Samples

	FB4	FB5	WSFB	WSFB	WFB-14-30	WFB-3-15	WFB-21-00	FB	GW2FB	FB10
FILTERED METALS	12/12/88	12/12/88	12/5/88	11/30/88	12/5/88	12/5/88	12/5/88	12/3/88	12/8/88	1/10/89
Aluminum	44	44	44		44	44	44	44	44	44
Antimony	33	33	33	158.8	47	39.9	33	81.2	129	122
Arsenic	4.8	4.8	4.8	4.8	4.8	4,.8	4.8	4.8	4.8	4.8
Barium	10.1	4.6	4.6		4.6	19.9	4.6	4.6	4.6	19
Beryllium	15	1.5	1,.5	1.9	1.5	1.5	1.5	2.8	2.9	2.9
Cadmium	3.5	3.5	3.5	13.5	3.8	4.1	3.5	5.3	11.8	9.9
Calcium	17200	78	78	1060	78	18500	78	107	230	18400
Chromium	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
Cobalt	2.8	2.8	2.8		2.8	2.8	2,8	2.8	2.8	2.8
Copper	9.3	9.3	9.3	9.3	9.3	15.2	9,3	9.3	9.3	11.4
Iron	40.6	4.8	45. i	85.3	79.2	35.6	22.4	4.8	12.2	19.3
Lead	5	5	5	5	5	5	5	5	5.6	5
Me mesium	5150	34	34	253	34	6780	34.	34	34	6460
Manganese	5.4	3.8	3.8		4:.7	11.5	3.8	3.8	14.6	4.5
Mercury	0.2	0.2	0.2		0.2	0.2	0.2	0.2	0.2	0.2
Nickle	12.4	12.4	12.4	1,2.4	12.4	12.4	12.4	12.4	16.2	12.4
Potassium	1170	125	124.8		125	1480	125	125	125	1380
Selenium	5	5	5	5	5 .	5	5	5	5	· 5
Silver	6.7	6.7	6.7	6.9	6.7	6.7	6.7	6.7	6.7	6.7
Sodjum	14700	30.4	544		30.4	16800	30.4	30.4	30.4	17200
Thallium ,	9.1	9.1	9.1	9.1	9	9.1	9.1	9.1	9.1	9.1
Vanadium	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Zinc	4	2.8	18.5	5.3	2.8	2.8	2.8	2.8	16.3	5.5
Cyanide					10	10	10	10	10	10

Combe Fitt South Chester, New Jersey Interim Environmental Monitoring – Round I Field Blank Samples

,	FB4	FB5	FB6	WSFB	FB	GW2FB	FB10	FB3	WFB-14-30	WFB-3-15	WFB-21-00
UNFILTERED METALS	12/12/88	12/12/88	12/15/88	12/10/88	12/3/88	12/8/88	1/10/89	12/12/88	12/5/88	12/5/88	12/5/88
Aluminum	78.8	44	44		44	44	134	44	44	237	. 44
Antimony	33	33	139		99.3	, 33	128	98.2	34.9	58	33
Arsenic	4.8	4.8	4.8		4.8	4.8	4.8	4.8	4.8	4.8	. 4.8
Barium	12.8	4.6	4.6		4.6	4.6	19.8	4.6	5.7	21.8	4.6
Beryllium	1.5	1.5	1.5		1.5	1.5	2.9	2.7	1.5	1,5	1.5
Cadmium	3.5	3.5	13.9		7.1	3.5	10	10	3.6	4	3.5
Calcium	17100	78	542	1060	6500	· 78	18800	397	4970	19300	78.4
Chromium	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
Cobalt	2.8	2.8	2.8		2.8	2.8	2.8	2.8	2.8	2.8	2.8
Copper -	9.3	9.3	9.3	9.3	9.3	9.3	13.6	9.3	9.3	21.2	13.7
Iron	181	20.8	4.8	85.3	22	4.8	65.8	4.8	1680	107	4.8
Lead	5	-5	5	5	5	5	5	5	5	5	5
Magnesium	5030	34	34	253	3020	34	6580	34	915	6800	34
Manganese	34.8	3.8	4.6		8.6	3.8	62.3	6	199	25.7	3.8
Метситу	0.2	0.2	0.2		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickle	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4
Potassium	1220	125	125		715	124.8	1390	165	148	1560	125
Selenium	5	.5	5		5	• 5	5	5	5	5	5
Silver	6.7	6.7	6.7		6.7	6.7	6.7	6.7	6.7	6.7	6.7
Section	14300	68000	30.4		8300	30.4	17300	30.4	994	17500	30.4
Thallium	9.1	9.1	9.1		9.1	9.1	9.1	9.1	9.1	9.1	9.1
Vanadium	4.5	4.5	4.5		4.5	4,.5	4.5	4.5	4.5	4.5	4.5
Zinc	6.8	2.8	3.5		2.8	2.8	5.3	3.4	2.8	14.8	2.8
Cyanide	10	10	10		10	10	10	10	10	10	10

NOTE

B- Indicates that the compound was analyzed for but not detected.

I- The concentration listed is an estimate value.

B- Indicates analyte was detected in the blanks as well as the sample.

^{(2) -} Data in parentheses are results from reron of sample.

Tentatively identified compounds are not included in the tables

MB- Method Blank

TB- Trip Blank

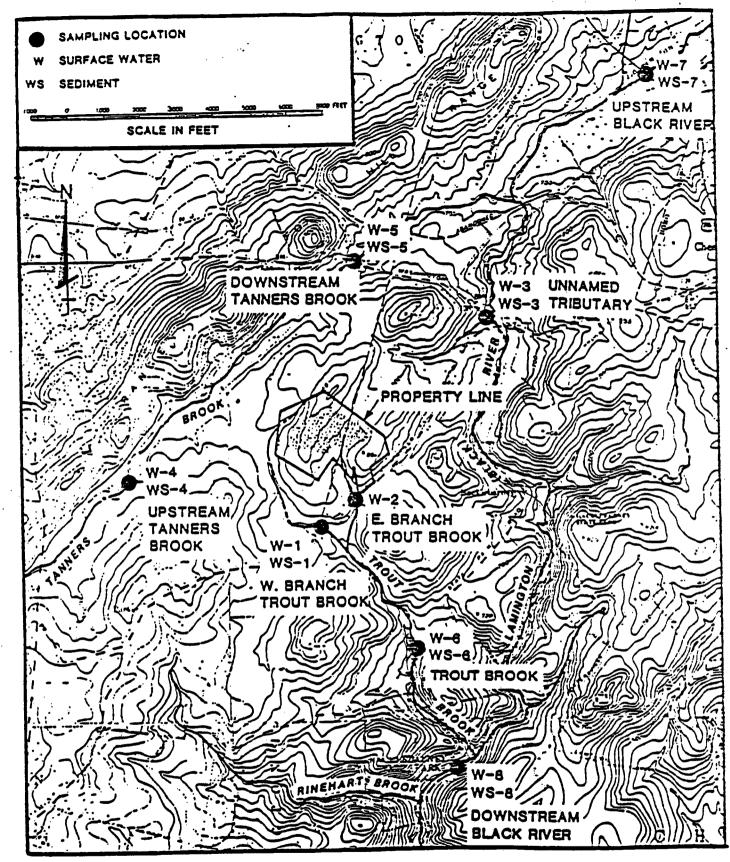
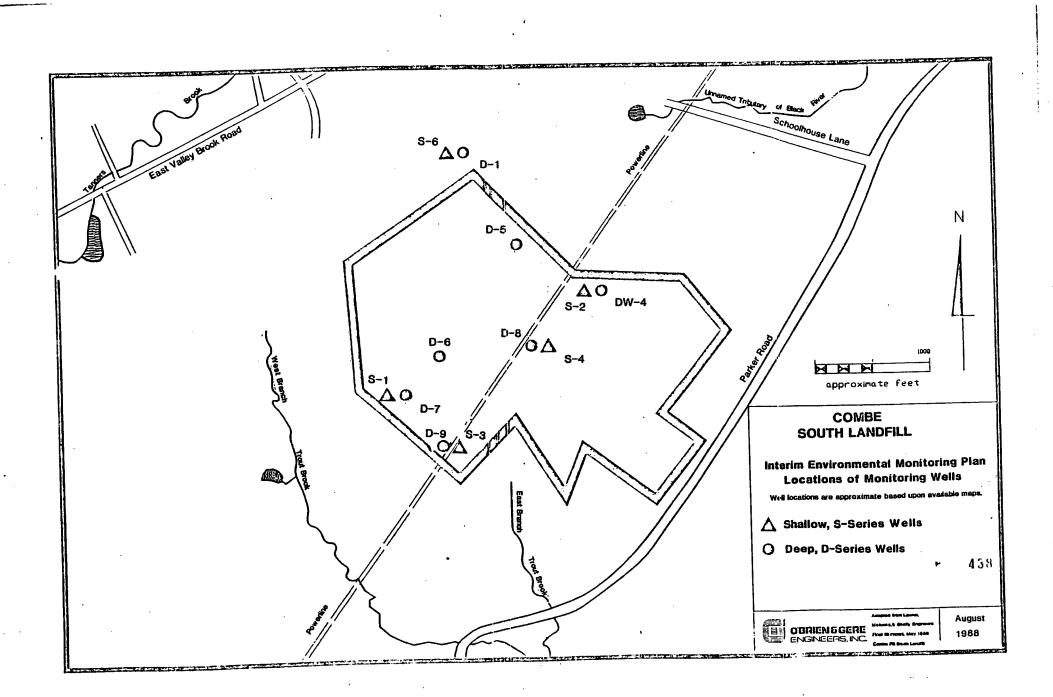


FIGURE 1

COMBE FILL SOUTH LANDFILL RI/FS - 437

SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS



VIII. Interim Environmental Monitoring (Second Round)

MEMO TO THE FILES

FROM:

N.R. Wilkinson

RE:

Combe Fill South Landfill -

Interim Environmental Monitoring

Program - Round 2

FILE:

3013.012 #3

DATE:

September 20, 1991

CC:

S.J. Roland

A.J. Caracciolo, III

The purpose of this memorandum is to provide a summary of the second sampling event of the Interim Environmental Monitoring Program at the Combe Fill South Landfill and present the results of that event. This section describes the methodologies employed for sampling and analysis and discusses problems and deficiencies associated with the program.

The objective of the second sampling event was to:

- supplement previously collected data;

- evaluate off-site migration of contaminants;

- assess health and environmental effects of contaminants; and

help provide guidance for writing a long term monitoring plan.

The second sampling event was conducted from May 30, 1990 to June 8, 1990. Sampling was conducted in accordance with the "Interim Environmental Monitoring Plan," November 1988. This plan detailed the collection and analysis of air, surface water, sediment and ground water samples. Sample collection methods were developed in accordance with the procedures outlined in the NJDEP document entitled "Field Sampling Procedures Manual", February 1988. Based on analytical data reported in the Remedial Investigation/Feasibility Study (LM&S Engineers, May 1986) and considerations presented in the Final Conceptual Design Report (LM&S Engineers, 1987), samples were analyzed for USEPA Target Compound List (TCL) volatiles, TCL semi-volatiles and metals.

The procedures used for analysis were in accordance with NJDEP Contract Laboratory Protocols (CLP) Tier-I and Tier-II. Approximately 40 percent of the samples were analyzed per the guidelines in Tier CLP-I with the remaining samples being analyzes via Tier-II protocols. York Laboratories, Inc. provided analytical services for this round of samples.

Memo to the Files September 20, 1991 Page 2

A summary of the sampling and analytical method for each media: air, surface water, sediment, and ground water, is presented in the following paragraphs. Sample locations are provided on the attached figures.

Air

During the second sampling event, air samples were collected from one up-wind and two down-wind locations in addition to one location at an emission point. These samples were obtained using the protocols for the collection of gaseous and particulate air samples as outlined in the NJDEP Field Sampling Procedure Manual, the NIOSH Manual of Analytical Methods (3rd. Ed., 1987) and EPA Method T01. TCL metals were captured on 0.8 micrometer cellulose acetate membrane filters (NIOSH method 7300) while TCL volatiles were captured on Tenax resin (USEPA Method T01).

Surface Water and Sediment

Eight surface water and eight sediment samples were obtained during the first sampling event. The location of these samples are shown on the attached figure.

The samples were collected using NJDEP Field Sampling Procedures Manual (July 1986). These samples were analyzed for USEPA TCL volatiles, semi-volatiles, and selected metals.

Ground Water

Twelve ground water samples were obtained during the second round of a two round sampling events. These samples were obtained from shallow wells S-1, S-2, S-3, S-4, S-5, and S-6 and from deep wells D-1, D-2, DW-4, D-7, D-8, and D-9 as shown on the attached figure. The samples were collected in accordance with NJDEP Field Sampling Procedures Manual (July 1986).

Each ground water sample was analyzed for USEPA TCL volatiles, semi-volatiles and metals using CLP analytical methods. Metals analysis was conducted on both filtered and un-filtered samples. Ground water samples were also submitted for conventional pollutant analysis. Parameters considered for this class included others pH, dissolved oxygen, TDS, TSS, NH4-N, NO3-N, Coliforms, and specific ions.

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Results

The results from the second round of sampling were submitted to the NJDEP for review. Based on the departments review of the data, the Division of Hazardous Site Mitigation issued comment memorandum dated December 13, 1990 and January 18, 1991. These memoranda indicated deficiencies with some of the laboratory data reporting. In response to these memoranda, O'Brien & Gere submitted revised data tables on August 29, 1991. These revised tables reflected both qualified and rejected data.

Following re-submission of the data summary tables, the NJDEP issued its final recommendations for the data on September 3, 1991. This letter advised the rejection of air monitoring results due to an absence of QA/QC data. Consequently, this data is not provided on the sample summary tables. Additionally, it suggested the negation of methylene chloride and acetone in DW-4 and methylene chloride and carbon disulfide in W-2 due to trip blank and method blank contamination.

Summary tables which incorporate the revisions outlined in each NJDEP memorandum are provided herein.

/kac

							•					
	SAMPLE		W-I			W-2		W-3		W∸4		W-5
VOLATILE ORGANICS (ppb)	DATE	MB	5/30/90	MB	TB	5/30/90	MB	5/31/90	MB	5/31/90	MB	5/31/90
Dilution Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
methylene chloride		U 1	U	41	Ü	6B	U	16(4JB)	U	19	U	9
carbon disulfide		U	U	13	U	IJB	U	U(U)	U ·	υ	U	U
1,1 dichloroethene		U	υ	Ų	. u .	U	U	บ(บ)	บ	U	U	u
trichloroethylene		U	ָ ט	U	Ú	· U	U	U(U)	U	U	υ	U
chlorobenzene		U	U	Ú.	U ·	U	U	U(U)	U	U	U	U
benzene		U	υ	U	U	21	υ	16(U)	U	100	υ	50
toluene .		U	. บ	U	U	U	U	U(U)	U	12	U	9
BASE NEUTRALS (ppb)							,					
Dilution Factor		2.00	2.00			2.00	2.00	2.00	2.00	2.00	2.00	2.00
di-n-butylphthalate		U	U			Ř	Ü	3)	U	21	U	21
phi d		· U	U			R	บ	U	U	U	υ	U
2-chlorophenol		U	U			R	- ນ	U	U	U	U	U
1,4-dichlorobenzene		U	U,		•	R	U	Ü	U	U	Ü	U
n-nitroso-di-n-popylamine		U	υ			R	U	υ	U	บ	Ü	U
1,2,4-trichlorobenzene		U	U			R	U	· U	U.	U	·U	U
4-chloro-3-methylphenol		U	U			R	U	U	U	U	υ	U
acenaphthene		U	U			R	U	U·	U	U	U	U
4-nitrophenol		Ü	U			R	U	U	U	U	U	U
2.4-dinitrotoluene		U	ับ			R	บ	U	U	U	u	U
pentachlorophenol		U	υ		•	Ř	U-	U	U	U	U	U
pyrene		Ü	U			R	lυ	υİ	U	U	U	U

SAN	MPLE		W-6			W-7			W-8			W-8DUP
VOLATILE ORGANICS (ppb) DA		TB	5/31/90	мв	TB	5/30/90	МВ	TB	6/4/90	MB	TB	6/4/90
Dilution Factor	1.00	1.00	1.00	1.00	1:00	1.00 '	1.00	1.00	1.00	1.00	1.00	1.00
methylene chloride	2J	5 B	10B	4J.	U	5JB	3)	41	3JB	33	43	3JB
carbon disulfide	Ü	U	U	IJ	U	ijВ	υ	Ü'	U	U	U	U
1,1 dichloroethene	Ü	. U	. U	U	U	Ü	U	U	U,	U	U	U
trichloroethylene	U	U	U	Ü	U	U	ن ا	U	U	U	U	U
chlorobenzene	U	U	U	U	U	U	บ	U	U	U	U	U
benzene	U	U	U	U	U	21	U	U	U	U	U	U
toluene	U	U	21	·U	U	U	U	U	Ü	U	U	U
BASE NEUTRALS (ppb)		•				:						
Dilution Factor	2.00		2.00	2.00		2.00	2.00		2.00	2.00		2.00
di-n-butylphthalate	υ		U	ש		U	U		U	U		11
phenol	. U		U	ט		U	U		U ∷	U		Ú
2-chlorophenol	U		U	U-		U	U		U	U		Ú
1,4-dichlorobenzene	U		U	⊎		U	U		U -	U		U
n-nitroso-di-n-popylamine	U	•	U	U	•	U	U		U	U		U
1,2,4-trichlorobenzene	U		U	U		U	U		U	ับ		U
4-chloro-3-methylphenol	U		Ų	υ		U	U		U	·U		U
acenaphthene	U		U	U .		Ü	υ		U	U		U
4-nitrophenol	U		U	U.		U	บ		U	U		บ
2,4-dinitrotoluene	U		U	U		U	υ		U	Ü		U
pentachlorophenol	U		U	บ	٠.	U	U	,	U	U		U
ругене	U		U	υ.		U	U		Ü	U		U

•	SAMPLE		W-8MS	1		W-8MSDUI
VOLATILE ORGANICS (ppb)	DATE MB	TB	6/4/90	MB	TB	6/4/90
Dilution Factor	1.00	1.00	1.00	1.00	. 1.00	1.00
methylene chloride	บ	41	11B	U	43	4JB
carbon disulfide	U	U	U	U	Ņ	20
I, I dichloroethene	U	U	102%	U '	U	114%
trichloroethylene	U	U	77%	U	Ú	86%
chlorobenzene	U	U	112%	υ	U	110%
benzene	U	U	84%	U	Ü	92%
toluene	U	U	104%	u	์ บ	114%
BASE NEUTRALS (ppb)						
Dilution Factor	2.00		2.00	2.00		2.00
dibutylphthalate	U		U	υ·		U
phenol	Ü		35%	υ		50%
2-chlorophenol	U		65%	υ		85%
1,4-dichlorobenzene	U		70%	U		79%
n-nitroso-di-n-popylamine	U	•	72%	υ		83%
1,2,4-trichforobenzene	U		70%	U		80%
4-chloro-3-methylphenol	· U		75%	U		100%
acchaphthene	U		81%	U		95%
4-nitrophenol	U		27%	U		45%
2,4-dinitrotolüene	Ü		68%	U		80%
pentachlorophenol	U		85%	บ		105%
pyrene	. U		94%	ุบ	•	98%

er, New Jersey Interim En En Enmental Monitoring – Round 2 Surface Water Sampling

UNFILTERED METALS (ppb)	SAMPL	W-1 5/30/90	W-2 5/30/90	W-3 5/31/90	W-4 5/31/90	W-5 5/31/90	W-6 5/31/90	W-7 5/30/90	W-8 6/4/90	W-8DUP 6/4/90	W-8MS 6/4/90	W-8MSDUP 6/4/90
aluminum	I BILLE	498	311JB	<200	367	230	345	274	229	217	93%	94%
antimony		<60	<60	<60	<60	<60	<60	<60	<60.0	<60.0	100%	98%
arsenic		<10	<10	<10	<10	<10	<10	<10	<10.0	<10.0	89%	92%
barium		40.4	40.7J	<10	18.1	15.4	22.8	15.0	17.1	17.1	89%	89%
beryllium		<5 ·	<5	<5	<5	<5	<5	<5	<5.0	<5.0	98%	99%
cadmium	1	< 5	< 5	<5	<5	<5	<5	<5	<5.0	<5.0	90%	91%
calcium		21100	23500JB	7310	8320	7950	18000	12700	17600	17700	93%	95%
chromium		12.4	<10	<10	<10	<10	<10	<10	<10.0	<10.0	91%	92%
cobalt		<50	<50	<50	<50	<50	<50	<50	<50.0	<50.0	95%	96%
copper		<25	<25	<25	<25	<25	<25	<25	<25.0	<25.0	92%	93%
iron		1650	557	429	792	629	745	664	500	463	96%	98%
lead	•	R	R	R·	R	R	R	R	R	R	R	R
magnesium		8590	9650J	2730	2600	2490	7650	5080	7270	7320	93%	94%
manganese	•	603	180	. 18.6	36	32.6	180	46.1	51.7	51.7	96%	97%
mercury		<0.2	<0.2	<0.2	<0.2	< 0.2	< 0.2	<0.2	<0.20	< 0.20	<0.20	<0.20
nickel		<40	<40	<40	<40	<40	<40	<40	<40.0	<40.0	93%	95%
potassium		5030	5550	<2000	<2000	<2000	2510	<2000	<2000	2000	121%	127%
selenium		<5	1.6JB	<5	<5	<5	<5	<5	<5.0	<5.0	87%	94%
silver		<10	. <10	<10	<10	<10	<10	<10	<10.0	<10.0	117%	118%
sodium		21000	18200J	4780	6100	5900	14300	13100	14300	14300	91%	92%
thallium		<10	2.9JB	<10	<10	· <10	<10	<10	<10.0	<10.0	88%	93%
vanadium		<50	<50∙	<50	<50	<50	<50	<50	<50.0	<50.0	90%	91%
zinc		<20	21JB	<20	<20	. <20	<20	<20	27.2	<20.0	87%	87%
cyanide		<10	<10	<10	<10	<10	<10	<10.0	<10.0	<10.0	89%	88%

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VOLATILE ORGANICS (ppb)	SAMPLE DATE	МВ	WS-1 5/30/90	WS-2 5/30/90	МВ	WS-3 5/31/90	МВ	WS-4 5/31/90	МВ	WS-5 5/31/90
Dilution Factor		1.00	1.27	R	1.00	1.08	1.00	1.40	1.00	1.28
methylene chloride		6(8)	U(7B)	R	6(8)	U(8B)	8(8)	12B(4JB)	8	14B
acetone		7J(U)	7JB(U)	R	7J(8J)	7JB(5JB)	83	U(U)	81	13B
1,1-dichloroethene		U	U(U)	R	U	U(U)	U	Ü(Ü)	บ	U
trichloroethylene		U	U(U)	R	U	U(U)	U	U(U)	U	U
benzene		U	U(U)	- R	U	Ŭ(Ū)	U	U(U)	U	บ
toluene		3J(U)	2JB(1J)	R	· U	2J(U)	U	U(U)	. U	U
chloroform		U	U(U)	R	U	U(Ú)	U	U(U)	U	U
chlorobenzene		U	U(U)	R	· U	U(U)	Ü	U(U)	·u	U
1.1.2.2-tetrachloroethane		3J(U)	U(U)	R	31	U(U)	U	U(U)	U	·U
styrene		2J(U)	U(U)	R	21	U(U)	U	U(U)	U	U

	SAMPLE			WS-6·		WS-7			WS-8			WS-8MS
VOLATILE ORGANICS (ppb)	DATE	MB	TB	5/31/90	MB	5/30/90	MB	TB	6/4/90	MB	ТВ	6/4/90
Dilution Factor		1.00	1.00	1.08	1.00	1.45	1.00	1.00	1.45	1.00	1.00	1.45
methylene chloride		8	5B	U	6(8)	Ú(Ú)	U	43	U	U	41	9B
acetone		U	U	U	7J(8J)	19B(9JB)	U	U	29	U	U	15
1,1-dichloroethene		U	U	U	່ ປ	U(U)	U	U	υ	U .	U	111%
trichloroethylene		U	U	U	U	U(U)	υ	U	υ	U	U	77%
benzene		U	U	U	, U	U(U)	υ	U	U	U	U	89%
toluene		U	U	U	3J(U)	2JB(2J)	υ	U	U	U	บ	105%
chloroform		U	U	U	บ่	U(U)	U	U	Ü	U	U	U
chlorobenzene		U	U	U	l u	U(U)	U	U	U	U	U	108%
1,1,2,2-tetrachloroethane		U	U	U	3J(U)	U(U)	U	U	U	U	U	U
styrene		U	U	U	2J(U)	Ü(Ü)	Ù	U	U	U	U	U

·	SAMPLE		WS	8-8MSDUP			WS-8DUP
VOLATILE ORGANICS (ppb)	DATE	MB	TB	6/4/90	MB	TB	6/4/90
Dilution Factor	<u> </u>	1.00	1.00	1.45	1.00	1.00	1.45
methylene chloride		U	4J	9B	· U	43	U
acetone		U	U	17	U	U	U
1,1-dichloroethene		U	U	97%	U	Ų	U
trichloroethylene		U	U	66%	Ü	u	U
benzene		U	U	78%	U.	U	U
toluene		U	U	97%	U	U	U
chloroform		U	Ú ·	υ	U	U	บ
chlorobenzene		U	U	101%	U	U	U
1,1,2,2-tetrachloroethane		U	U	U	U [.]	U	U
sty. ene		υ	U	U	U	U	U

BASE NEUTRALS (ppb)	SAMPLE DATE	MB	WS-1 5/30/90	MB	WS-2 5/30/90	MB	WS-3 5/31/90	мв	WS-4 5/31/90	мв	WS-5 5/31/90
Dilution Factor		33.3	42.2	33.3	58.5	33.3	42.7	33.3	43.9	33.3	52.9
phenol		U	U	U	ບາ	U	, U	U	U	U	U
2-chlorophenol		U	บ	U	UJ	U	U	U	U	U	U
1,4-dichlorobenzene		U	Ù	U	Ü	υ	U	U	บ	U	Ü
n-nitroso-di-n-propylamine		υ	U '	บ	U	U	U	U	U	U	U
1,2,4-trichlorobenzene		U	u	U	υ	U	U	υ	U	U.	บ
4-chloro-3-methylphenol		บ	υ.	U	UJ	U	U	U	U	U	U
acenaphthene		U	U	U	U	U	U	U	U	Ü	U
4-nitrophenol		U	U	U	220J	Ü	ับ	U	U	U	บ
2,4-dinitrotoluene		U	υ	U	U	Ü	U '	U	U	U	U
phenanthrene		U	82J	Ü	451	U	U.	U	່ ບ	U	n .
Nuoranthene		U	1201	U	713	U	U	υ	U _:	U	U
ругене		U	1001	U	651	υ	U	υ	U	U	U
benzo(a)anthrucene		U	U	U	U	υ	U	· U	U	U	U
pentachlorophenol		U	U	U	UJ .	U	U	υ	U	U	U
chrysene		υ	95J	U	52J	U	U	U	υ	U	บ
his(2-ethylhexyl)phthalate		U	Ù	Ü	1201	U	24J	U	25J	U	32J
benzo(b)fluoranthene		U	1501	U ·	491	U	U	u	U	U	Ü
benzó(k)fluoranthene		U	140).	U	36J	U	U	U	U	U	U
henzo(a)pyrene		U	1801	U	U	U	υ	U	U	U	U
anthracene		U	U	U	U	U	U	U	Ü	U	. U
di-n-butylphthalate		U	· U	U	541	U'	U	Ü	U	U	22J
indeno(1,2,3,c,d)pyrene		U	873	Ù	U	U	Ü	U	U	U	U
benzo(g,h,i)perylene		U	79J	U	Ú.	υ	U	U	u	U	Ü

	SAMPLE		WS-6		WS-7	1	WS-8		WS-8M\$		WS-8DUI
BASE NEUTRALS (ppb)	DATE	MB	5/31/90	МВ	5/30/90	MB	6/4/90	MB	6/4/90	MB	6/4/90
Dilution Factor		33.3	42.7	33.3	48.3	33.3	48.3	33.3	43.9	33.3	47.6
phenol ⁻		U	U	U	U	U	U	υ	60%	U	52%
2-chlorophenol		U	U	U	์ บ	U	U	U	55%	U	47%
1,4-dichlorobenzene		U	υ	U	U	U	U	υ	48%	U	44 %
n-nitroso-di-n-propylamine		U	U	U	U	U	U	U	52%	U	48%
1,2,4-trichlorobenzene		U	U	υ	U	U	U	U	50%	U	48%
4-chloro-3-methylphenol		U	U	ប	U	U	U .	υ	57%	U	49%
acenaphthene		U	U	U	U	· U	U	U	55%	U	52%
4- rophenol		U	U	U	U	ับ	U	υ	58%	U	52%
2,4-dinitrotoluene		U	U	U	U	U	U	บั	36%	U	42%
phenanthrene		U	72J	υ	481 '	U	U	Ü	U	U	U
fluoranthene		U	1001	U	80J	U	U	Ü	U	U	U
pyrene		υ	1001	U	1001	υ	Ù	· U	64%	U	56%
benzo(a)anthracene		U	511	U	U	Ų	U	บ	U	U	U
pentachlorophenoi		U	U	υ	υ	U	U	U	25%	บ	32 %
chrysene		U	571	U	66J	U	. U	u	U	U	U
bis(2-ethylhexyl)phthalate		U	33J	υ	Ü	U	20J	U	25 J	U	211
benzo(b)fluoranthene		U	28J	U	บ	U	U	็บ	U	U	Ü
benzo(k)fluoranthene		U	35J	υ	· U	U	U	U	U	Ü	Ü
benzo(a)pyrene		U	40J	U	U	υ	. U	U	Ú	U	บ
anthracene		U	U	U	U	U	U	บ	Ü	U	U
di-n-butylphthalate		U	U	U	U	U	U	U	U	U	U
indeno(1,2,3,c,d)pyrene		U	U	U	U	U	U	ប	U	U	·U
benzo(g,h,i)perylene		U	u	น	บ	υ	U	U	U	บ	U

	SAMPLE	WS-1	WS-2	WS-3	WS-4	WS-5	WS-6	WS-7	WS-8 6/4/90	WS-8MS 6/4/90	WS-8MSDUP 6/4/90	WS-8DUP 6/4/90
UNFILTERED METALS (ppm)	DATE	5/30/90	5/30/90	5/31/90	5/31/90	5/31/90	5/31/90	5/30/90		0/4/90	0%	8580
aluminum		2290	37400J	4490	4160	5080	5460	21900	9390			
antimonÿ		<7.59	បរ	<6.47	<6.61	<7.70	<6.44	<8.70	<8.70	59%	58%	<8.70
arsenic		3.32	5.83	1.91	<1.10	<1.28	2.09	3.8	1.97	74%	86%	1.63
barium		37.4	135	18.3	25. 9	35.3	48.4	110	36.8	90%	84%	33.7
beryllium		< 0.63	1.95	0.73	1.01	< 0.64	0.88	<0.72	<0.72	89%	85%	<0.72
cadmium		< 0.63	R	< 0.54	< 0.55	< 0.64	< 0.54	<0.72	< 0.72	74%	73%	<0.72
calcium		394	2550J	545	610	376	3100	1350	770	85%	64%	658
chromium		1.93	12.9J	<1.08	<1.10	<1.28	10.6	23.8	18.7	71%	52%	12.7
cobalt		6.36	20.9	<5.39	<5.51	<6.42	6.86	24.6	<7.25	97%	92%	<7.25
		<3.16	26.6J	3.8	<2.75	3.38	6.32	25.9	4.13	99%	83%	<3.62
copper		5950	39000J	9100	18100	8920	10200	25900	23000	0%	0%	20600
iron		3.58	40J	6.27	8.02	8.33	6.1	30.8	<7.25	93%	90%	<7.25
tead .		330	3040JB	604	388	419	2460	3270	966	115%	82%	1003
magnesium		1190	9151	150	295	59.7	1310	665	484	71%	0%	377
manganese		<0.11	0.291	<0.11	.<0.11	<0.13	<0.12	0.13	<0.13	<0.12	<0.12	< 0.12
mercury		<5.06	13.4	<4.31	<4.40	<5.13	5.36	16.1	<5.80	95%	91%	<5.80
nickel		226	1800	334	152	174	388	2330	397	114%	76%	444
potassium			0.88J	<0.54	<0.55	< 0.64	<0.54	<0.72		59%	60%	<0.72
selenium		< 0.63			<1.10	<1.28	<1.07	<1.45	<1.45	82%	83%	<1.45
silver		<1.26	1.75	<1.08	· ·	<1.28	<107	507	<145	110%	111%	<145
sodium		<126	211JB	<108	<110		<1.07	<1.45	<1.45	91%	92%	<1.45
thallium		<1.26	0.491	<1.08	<1.10	<1.28				89%	76%	25.5
vaṇadium		<6.33	70 <u>.</u> IJ	8.76	10.9	7.43	14	53.9		83%	70 % 79 %	17.4
zinc		13.9	1433	23.1	35.6	41.6	30.9	58.4	21.4			<1.30
cyanide		<1.26	<1.75	<1.08	<1.10	<1.28	<1.07	<1.45	<1.45	94%	96%	×1.30

INORGANICS	SAMPLE DATE	WS-1 5/30/90	WS-2 5/30/90	WS-3 5/31/90	WS-4 5/31/90	WS-5 5/31/90	WS-6 5/31/90	WS-7 5/30/90	WS-8 6/4/90	WS-8MS 6/4/90	WS-8MSDUP 6/4/90	WS-8DUP 6/4/90
	DATE											NA
рН		NA	NA	NA	ŇA	NA	7.4	NA	NA	NA	NA	
TSS (mg/l)		NA	NA	NA	NA	NA	6.0	NA.	NA	NA	NA	NA
TDS (mg/l)		NA	NA	NA	NA	NA	160	NA	NA	NA	.NA	N.A
specific conductance (umhos/cm)		NA	NA	NA	NA	NA	350	N.A.	NA	NA	NA	NA
chloride (mg/l)		NA	NA	NA	NA	NA	35	NA	NA	NA	NA	NA
nitrate (mg/l)		NA	NA	NA	N [.] A	NÁ	1.57	NA	NA	NA	NA	ŇΑ
COD (mg/l)		NA	NA	NA	NA.	NA '	<10.0	NA	NA	NA	NA	NA
TKN (mg/l)		NA	NA	NA	NA	· NA	0.59	NA	NA	NA	NA	ŅA
ammonia (mg/l)	•	NA	NA	NA	NA	NA	0.24	N.A	NA	NA	NA	NA .
sulfate (mg/l)	,	NA	NA	NA	NA	NA	<0.5	NA	NA	NA	NA	NA
phosphorous (mg/l)		NA	NA	NA	NA	NÁ	<1.0	NA	NA	.N.A	N.A	NA
BOD5 (mg/l)	•	NA	NA	NA	N·A	NA	1200	NA	NA	NA	NA	NA
total coliform (colonies/100ml)		NA	NA	N.A	NA	NA	880	N.A	NA	ÑΑ	NA	NA
fecul coliform (colonies/100ml)		NA	NA	NA	NA	NA	NA	N.A.	NA	NA	NA	NA

Notes:

- U- Indicates that the compound was analyzed for but not detected.
- J- The concentration listed is an estimated value.
- R- The analysis was rejected by NJDEP QAS during the data validation process.
- B- Indicates analyte was detected in the blanks as well as the sample.
- NA- Not analyzed

Tentatively identified compounds are not included in the tables.

- (2)- Data in parentheses are results from rerun of sample.
- *- Sample was analyzed for nitrate plus nitrite.
- MB- Method Blank
- TB- Trip Blank

Combe Fill South Chester, New Jersey Interim Environmental Monitoring – Round 2

Shallow	Well	Monitoring
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	Sample			S-1	1	S-2**	¥	S-3		S-4		S-5
VOLATILE ORGANICS (ppb)	, -	MB	TB	6/7/90	МВ	6/6/90	MB	6/1/90	MB	6/1/90	MB	6/8/90
dilution factor	•	1.00	1.00	1.00	1.00	1.00	1.00	5.00	1.00	1,00	1.00	1.00
chloroethane		U	U	6J	U	υ	U	U	U	U	U	U
methylene chloride		บ	10	IOB	U,	U	2ป	35B	3J	U	U	5
acetone		22	21B	39B	U	30	υ	330	U	62	81	U
carbon disulfide		U	U	IJ	υ	U	U	2J	บ	U	U	U
1,1- dichloroethene		U	U	U	U	U	υ	υ	U	21	U	U
1,1 dichloroethane		U	U	IJ	U	υ	U	U	U	Ü	U	U
chloroform		U	U	U	, U	บ	U	U	U	U	U	120
2-butanone		U	U	U	υ	U	U	180	51	U	υ	U
I, I, I-trichloroethane		U	U	Ú	υ	U	U	U	U	U	U	U
trichloroethylene		U	บ	U	Ü	U	U	U	U	U	U	U
benzene		U	U	35	U	2J	U	6	Ü	8	U	31
4-methyl-2-pentanone		U	บ	U	U	U	U	บ	บ	U	U	U
2-hexanone		U	U	U	U	U	U	U	U	U	Ü	U
toluene		Ü	U	20	ͺυ	υ	U	U	U	Ü	ป	υ
chlorobenzene		U	U	140	U	22	U	39	U	32	U	υ
ethylbenzene		U	U	6	U	Ü	U	Ü	U	์ บ	U	U
total xylenes		· U	U	12	U	U	Ü	Ü	υ	U	U	U

Combe Fill South Chester, New Jersey

Interim Environmental Monitoring – Round 2 Shallow Well Monitoring

	Sample	•		S-6			S-6DUP		S-4MS		S-4MSDUP
VOLATILE ORGANICS (ppb)	Date	MB	TB	6/5/90	MB	TB	6/5/90	MB	6/5/90	MB	6/5/90
dilution factor	• • • • • • • • • • • • • • • • • • • 	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
chloroethane		U	Ü	U(U)	U	U	- 11	U	U	U	3J
methylene-chloride		U	21	6B(5B)	U	2J	12B	U	31	U	U ·
acetone		7J:	U	U(U)	Ü	U	ម	U	53	Ü	49
carbon disulfide		U	U	U(84)	U	U	U	U	U	U	U
1, 1- dichloroethene		U	U	U(U)	Ü	U.	υ	U	112%(U)	U	108%(U)
I, I dichloroethane		Ü	U	U(U)	U	U	U	U	U	U	U
chloroform		U	บ	U(U)	U	U	υ	U	υ	Ü	Ü
2-butanone		U	U	U(U)	U	Ü	υ	Ų	U	U	U
1, 1, 1-trichloroethane		U	U	U(U)	ย	U	21	U	υ	U	U
trichloroethylene		U	U	U(U)	U	U	υ	U	86%	U	84%
benzene		U	U	3 J (Ü)	U	Ü	υ	U	78%	U	76%
4-methyl-2-pentanone		Ú.	U	, U(U)	U	U	U	U	u	U	U
2-hexanone		U	U	U(U)	Ü	U	U	U	U	U	U
toluene		Ú	U	U(U)	U	U	υ	U	114%	U.	110%
chlorobenzene		U	U	U(U)	u	U	υ	U	122%	• U	114%
ethylbenzene		U	Ü	U(U)	, u	U	. υ	U ·	U	U	U
total xylenes		บ	U·	U(Ü)	U	U	υ	U	Ü	U	ช

Combe Fill South Chester, New Jersey Interim Environmental Monitoring - Round 2 Shallow Well Monitoring

	Sample		S-I		S-2**		S-3		S-4		S-5
BASE NEUTRALS (ppb)	Date	MB	6/7/90	MB	6/6/90	MB	6/1/90	MB	6/1/90	MB	6/8/90
dilution factor		2.00	2.02	2.00	2.15	2.00	2.04	2.00	2.00	2.00	2.15
i,4-dichlorobenzene		U	น(บ)	U	33	U	8J	U	74%	U	U
1,2-dichlorobenzene		U	181 (191)	ย	6J	U	13	U	21	U	U
bis(2-chloroisopropyl)ether		U	U(U)	U	U	U	U	U	บ	υ	U
N-Nitroso-di-n-Propylamine		·U	U(U)	Ū	U	U	U	U	69%	U	U
naphthalene		U	U(U)	U	U	U	43	U	U	Ü	Ü
4-Chloro-3-methylphenol		U	U(U)	U	U	U	Ū	U	28	U	U
Acenaphthene		U	U(U)	U	, , U	บ.	U	Ü	79%	U	U
2,4-Dinitrotoluene		U	U(U)	υ	U	U	Ü	บ	55%	Ü	U
dicthylphthalate		U	111 (91)	U	· U	U	41	U	Ü	U	U
di-n-butylphthalate		. U	บ(บ)	U	U	U	IJ	υ	2J	U	U
pyrene		U	U(U)	U	· U	U	U	U	84%	U	U
bis(2-ethylhexyl)phthalate		Ü	31 (31)	U	2 J	U	56	U	IJ	υ	2 J
di-n-octylphthalate		U	U(U)	U	U	U	2 J	U	υ	υ	U

Combe Fill South Chester, New Jersey Interim Environmental Monitoring - Round 2 Shallow Well Monitoring

	Sample		S-6		S-6DUP	S-4MS	S-4MSDUP
BASE NEUTRALS (ppb)	Date	MB	6/5/90	MB	6/5/90	6/5/90	6/5/90
dilution factor		2.00	2.00	2.00	2.02	NA	NA
1,4-dichlorobenzene		U	U	U	U	NA	NA
1,2-dichlorobenzene		U·	U	U	Ų	NA	NA
bis(2-chloroisopropyl)ether		U	U	U	U	NA	NA
N-Nitroso-di-n-Propylamine		U	U	ប	U	NA	NA
naphthalene		U	U	U	U	NA	NA NA
4-Chloro-3-methylphenol		U	U	ប	· U	NA	NA
Acenaphthene		U	U	ប	U	NA	NA
2,4-Dinitrotoluene		U	U	U	U	NA	NA
diethylphthalate		U	U	U	U	NA	NA
di-n-butylphthalate		U	U	U	Ņ	NA	NA.
pyrene		U.	U	Ų	U	NA	NA
bis(2-ethylhexyl)phthalate		U	31	U	43	NA	NA
di-n-octylphthalate		U	U	U	Ü	NA	NA

Combe Fill South Chester, New Jersey Interim Environmental Monitoring – Round 2 Shallow Well Monitoring

Sample UNFILTERED METALS (ppb) Date	S-1 6/7/90	S-2** 6/6/90	S-3 6/1/90	S-4 6/1/90	S-5 6/8/90	S-6 6/5/90	S-6DUP 6/5/90	· S-4MS 6/5/90	S-4MSDUP 6/5/90
· · · · · · · · · · · · · · · · · · ·	1540	<200	1130	28000	<200	835	783	1220EX	37800
antimony	<60.0	<60.0	<60.0	<60.0	<60.0	<60.0	<60.0	90%	<60.0
arsenic	<10.0	<10.0	10.0	<10.0	<10.0	<10.0	<10.0	40%	<10.0
barium	610	131	202	206	11.0	18.1	. 18.3	0%	205
beryllium	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	100%	<5.00
cadmium	<5.00	<5.00	33.4	<5.00	<5.00	<5.00	<5.00	86%	<5.00
calcium	182000	22700	206000	181000	5240	5000	5000	0%	170000
chromium	<10.0	<10.0	37.3	. 11.7	<10.0	13.5	11.9	92%	13.0
cobalt	55.7	<50.0	151	<50.0	<50.0	<50.0	<50.0	91%	<50.0
copper	54.7	<25.0	36.6	30.6	<25.0	<25.0	<25.0	92%	31.4
iron	105000	29400	21000	39000	172	749	934	1985% EX	40100
lead •	R	R	R	R	R	R	R	R	R
magnesium	83100	9030	67700	60500	1750	<1000	<1000	0%EX	56800
manganese	10100	4300	41900	17500	<15.0	15.8	<15.0	0%EX	16400
mercury	< 0.20	0.74	<0,20	<0.20	< 0.20	<0.20	<0.20	29%	<0.20
nickel	<40.0	<40.0	49.1	<40.0	48.7	<40.0	<40.0	91%	<40.0
potassium	8890	3150	4750	7830	<2000	<2000	<2000	104%	7430
sclenium	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	52%	<5.00
silver	<10.0	<10.0		<10.0	<10.0	<10.0	<10.0	70%	<10.0
sodjum	109000	49900	43700	153000	5650	2530	2860	0%EX	144000
thallium	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	68%	<10.0
vanadium	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	100%	<50.0
zinc	53.1	36.4	173	67.7	<20.0	69.8	51.4	90%	72.0
cyanide	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	84%	<10.0

Combe Fill South Chester, New Jersey Interim Environmental Monitoring – Round 2 Shallow Well Monitoring

	Sample	S-1	S-2**	S-3	S-4	S-5	S-6	S-6DUP		S-4MSDUP
FILTERED METALS (ppb)	Date	6/7/90	6/6/90	6/1/90	6/1/90	6/8/90	6/5/90	6/5/90	6/5/90	6/5/90
aluminum		<200	<200	<200	3880	<200	<200	<200	87%	4270
antimony		<60.0.	<60.0	<60.0	<60.0	<60.0	<60.0	<60.0	922%	<60.0
arsenic		<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	79%	<10.0
barium		491	125	197	131	10.2	15.7	14.0	05	126
beryllium		<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	91%	<5.00
cadmium		<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	81%	<5.00
calcium		171000	22000	201000	181000	5480	<5000	<5000	0%EX	165000
chromium		<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	88%	<10.0
cobalt		<50.0	<50.0	136	<50.0	<50.0	<50.0	<50.0	87%	<50.0
copper .		<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	90%	<25.0
iron		80900	23200	18500	10900	<100	<100	<100	209 % EX	9170
lead		R	R	R	R	R	R	R	R	R
magnesium		79000	8830	66100	59700	1840	<1000	<1000	19%EX	54500
manganese		9230	4190	40700	17400	<15.0	<15.0	<15.0	0%EX	16000
mercury		<0.20	<0.20	<0.20	<0.20	< 0.20	< 0.20	<0.20	30%	<0.20
nickel		<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	85 %	<40.0
, potassium		8600	3590	4480	5480	<2000	<2000	<2000	93%	5090
selenium		<5.00	<5.00	<5.00	5.00	<5.00	<5.00	<5.00	48%	<5.00
silver	•	<10.0	<10.0	<10.0	<10.00	<10.0	<10.0	<10.0	64%	<10.0
sodium		102000	49800	43200	156000	5930	3140	2730	0%EX	144000
t' - Hium		<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	64%	<10.0
vanadium		<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	90 %	<50.0
zinc		44.3	28.5	46.2	32.2	<20.0	57.8	51.5	84%	30.5
24114										-

Combe Fill South Chester, New Jersey Interim Environmental Monitoring – Round 2 Shallow Well Monitoring

	Sample	S-1	S-2**	S-3	S-4.	S-5	S-6	S-6DUP	S-4MS	
INORGANICS	Date	6/7/90	6/6/90	6/1/90	6/1/90	6/8/90	6/5/90	6/5/90	6/5/90	6/5/90
pH	-	6.40	6,1	5.86	6.69	6.7	6.21	NA	NA	NA
TSS (mg/l)		<1.0	50,9	5.3	62.1	<1.0	526	NA	NA	NA
TDS (mg/l)		1520	291	1670	1580	65.6	33.3	NA	NA	NA
specific conductance(umhos/cm)		2470	445	2300	2460	0.60	26.9	NA	NA	NA
chloride (mg/l)		440	42	510	580	3.5	2.7	NA	NA	NA
nitrate (mg/l)		<0.10	<0.10	<0.10	<0.10	0.47*	0.52	NA	NA	NA
COD (mg/l)		63.1	<10.0	95.2 .	65.6	<10.0	<10.0	NA	N.A	NA
TKN (mg/l)		6.99	0.67	2.71	2.53	0.16	0.83	NA	NA	NA
ammonia (mg/l)		4.26	< 0.04	<0.04	<0.04	< 0.04	0.07	NA	NA	NA
sulfate (mg/l)		<10.0	46.6	<10.0	<10.0	<10.0	<10.0	NA	NA	NA
phosphorous (mg/l)		< 0.15	<0.15	<0.15	<0.15	<0.15	<0.15	NA	NA	NA
BOD (mg/l)		30	2	49	8	<1.0	<1	NA	N.A	NA
total coliform (colonies/100ml)		<1000	6	<1	<1	260	264	NA	NA	NA
fecal coliform (colonies/100ml)		<100	<1	<1	. <1	<10.0	19	N.A	N.A	NA

NOTE:

- U- Indicates that the compound was analyzed for but not detected.
- J- The concentration listed is an estimated value.
- R- Data point was rejected during the data validation process.
- B- Indicates analyte was detected in the blanks as well as the sample.
- (2) Data in parentheses are results from rerun of sample.

Tentatively identified compounds are not included in the tables:

- •- Sample was analyzed for nitrate plus nitrite.
- ••- Sample results are qualified because hold time was two days expired.
- NA- Not Analyzed
- MB- Method Blank
- TB- Trip Blank

	SAMPLE		D-1		D-2	}		DW-4			D-7
VOLATILE ORGANICS (ppb)	DATE	МВ	6/5/90	МВ	6/8/90	. мв	TB	6/7/90	МВ	TB ·	6/5/90
Dilution Factor	· · · · · · · · · · · · · · · · · · ·	1.00	1.00	1.00	1.00	1.00	ı	1.00	1.00	1.00	1.00
methylene chloride		U	14(U)	U	н	บ	10	8JB(10B)	U	2J	12B(8B)
acetone		5J(7J)	36B(31B)	U	Ú	22	21B	21JB(U)	U	υ	U(U)
carbon disulfide		U	U	U	U	įυ	IJ	U	U	Ū	11(11)
1,1-dichloroethane		U	U	U	21	• บ	U	U	U	U .	U(U)
chloroform		U	U	Ū	52(46)	΄ υ	Ņ	94(65)	U	บ	Ņ(U)
1,2-dichloroethane		U	U	U	U	υ	U	U(10)	U	U	U(U)
1,1,1-trichloroethane		U	3J(U)	υ	. U(8)	U	U	U	U T	U	U(8)
trichloroethylene		U	U	U	U .	U	U	12(7)	U	U	U(U)
benzene		U	10(U)	Ü	21(35)	U	IJ	R	U	U	44(11)
tetrachloroethylene		υ	U	U	6(15)	U	Ú	4J(U)	U	U	U(U)
toluene		υ	2J(U)	U	U(4J)	U	Ú	U	u	U	4J(2J)
chlorobenzene		U	u	U	U	Ú	'n	3J(U)	U	. Ū	N(11)
BASE NEUTRALS (ppb)			<i>r</i>			· -					
Dilution Factor		2.00	2.00	2.00	2.04	2.00		2.02	2.00		2.11
phenol		. U	บ	U	U	. U	•	.U	U		U
2-chlorophenol		U	U	U	U	υ		U	Ü		5J
1.4-dichlorobenzene		U	U	U	U	U		U	U		U
ntroso-di-n-propylamine		U	U	U	U	· U		U	Ü		υ
1,2,4-trichlorobenzene		U	U	U	U .	U		υ	U		U
4-chloro-3-methylphenol		U	ย	. 0	U	υ		U	U		' ប
acenaphthene		U	U	U	U	U		υ	U		U
4-nitrophenol		U	U	υ	U .	U		υ	U		U
2,4-dinitrotoluene		υ	υ	υ	U	u		U	U		U
diethylphthalate		U	U	ΰ	U	U		2յ	U		U
pentachlorophenol		U	U	υ	U	U		U	U		U
pyrene		Ū	U	U	U ·	U		U	U		U
bis(2-ethylhexyl)phthalate		Ü	2J	บ	2J	· U		31	U		21
\$		-						•			

	SAMPLE		D-8		D-9			D-7DUP			D-7MS
VOLATILE ORGANICS (ppb)	DATE	MB	6/6/90	MB	6/6/90	МВ	TB	6/5/90	MB	ТВ	6/5/90
Dilution Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1,00	1.00
methylene chloride		U	12	U	7	U	2J	10B	U	2 J	7B(7B)
acetone		51	51B	5J(7J)	51B(57B)	υ	U	· U	U	Ü	U(U)
carbon disulfide		U	U	u	U	U	U	IJ	U	U	IJ(U)
l, l-dichloroethane		U	U	U	U	Ü	U	U	U	U	U(88%)(114%)
chloroform		U	U	U	υ	U	Ú	U	υ	U	U(U)
1,2-dichloroethane		U	U	U	U	U	U	U	U	U	U(U)
l, l, l-trichloroethane		U	U	U	U	įυ	บ	21	U	U	2J(U)
trichloroethylene		U	Ú	Ų	U	U	U	U	U	U	118%(88%)
henzene		U	10	U	13(41)	U	U	5J	U	U	30% (96%)
tetrachloroethylene		U	U	U	U	Ü	U	U	U	Ü	Ú(Ú)
tolucié		U	3J	υˈ	U ·	. U	U	U	U	U	98%(110%)
chlorobenzene		U	6	U	2J .	U	U	2Ј	U	U	120%(114%)
BASE NEUTRALS (ppb)				9							
Dilution Factor		2.00	2.17	2.00	2.04(2.06)	2.00		2.00	2.00		2.11
phenol '		U	บ	υ	u'	U		U	υ		42%
2-chlorophenol		U	Ü	บ	U	U		U	U		68%
1,4-dichlorobenzene		U	บ	U	U	· U		U	U .		77%
n-nitroso-di-n-propylamine		U	บ	U	U	Ü		· U	U		74%
1,2,4-trichtorobenzene		U	U	U	U	ับ		U	υ		88%
4-chloro-3-methylphenol		U	U	υ	U	U		U	U		85%
acenaphthene		U	U	U	U	Ü		U	U		95%
4-nitrophenol		U	U	U	U	U		Ú	υ	•	42%
2,4-dinitrotoluene		U	υ	U	U	υ		U	U		69%
diethylphthalate		U	U	U	2J(U)	υ		2 J	U		U
pentachlorophenol		U	U	U	U	U		U	U		65%
pyrenie		U	บ	U	U	υ		U	U		100%
bis(2-ethylliexyl)phthalate		U	2J	U	41	U		2Ј	υ		2Ј

Combe Fill South Chester, New Jersey Interim Environmental Monitoring - Round 2 Deep Well Monitoring

	SAMPLE			D-7MSDUP
VOLATILE ORGANICS (ppb)	DATE	МВ	TB	6/5/90
Dilution Factor		1.00	1.00	1.00
methylene chloride		U	21	12B(5JB)
acetone		U	U	9J(U)
carbon disulfide		U	U	2J(U)
1,1-dichloroethane		U	U	(82%)(118%)
chloroform		υ	U	U(U)
1,2-dichloroethane		U	U	U(U)
1,1,1-trichloroethane		U	U	2J(U)
trichloroethylene		Ü	U	110%(86%)
benzene		U	U	46% (96%)
tetrachloroethylene		U	U	U(U)
toluene		U	U	94%(108%)
chlorobenzene		U	U	116%(114%)
BASE NEUTRALS (ppb)				•
Dilution Factor		2.00		2.06
phenol		U		27%
2-chlorophenol		Ü		58%
1,4 dichlorobenzene		U		78%
n-nitroso-di-n-propylamine		U		77%
1,2,4-trichlorobenzene		U.		90%
4-chloro-3-methylphenol		U		90%
acenaphthene		U		96%
4-nitrophenol		U		32%
2,4-dinitrotoluene		U		71%
diethylphthulate		U		U
pentachlorophenol		U		47%
pyrene		U		110%
bis(2-ethylhexyl)phthalate		U		21

Combe Fill South Chester, New Jersey Interim Environmental Monitoring – Round 2 Deep Well Monitoring

	SAMPLE	D-1	D-2	DW-4	D-7	D-8	D-9	D-7DUP	D-7MS	D-7MSDUP
UNFILTERED METALS (ppb)	DATE	6/5/90	6/8/90	6/7/90	6/5/90	6/6/90	6/6/90	6/5/90	6/5/90	6/5/90
aluminum		<200	<200	<200	<200	<200	<200	<200	<200	<200
antimony		<60.0	<60.0	<60.0	<60.0	<60.0	<60.0	<60.0	<60.0	<60.0
arsenic		<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
barium		10.2	11.1	11.7	. 373	181	58.2	390	391	387
berryllium		<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
cadmium		<5.00	<5.00	<5.00	<5.00	<5.00	50.9	<5.00	<5.00	<5.00
calcium '		10500	35300	33000	236000	208000	171000	249000	249000	246000
chromium		<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
cobult		<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0
copper		<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0
iron		235	201	46900	8510	8470	567	9280	9130	8390
lead		R	R	R	R	R	R	R-	R	R
magnesium		3590	9580	17800	111000	70200	80900	116000	116000	115000
manganese		<15.0	<15.0	873	4420	7470	4810	4660	4660	4620
mercury		<0.20	0.83	<0.20	< 0.20	< 0.20	<0.20	<0.20	<0.20	<0.20
nickel		<40.0	<40.0	<40.0	59.0	<40.0	<40.0	56.2	57.7	57.2
potassium		<2000	2260	2470	8930	7020	5250	9580	9380	9740
selenium		<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
silver		10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
sodium		4720	14200	8500	240000	208000	80400	253000	252000	250000
thallium		<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
vanadium		<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0
zinc		21.0	29.6	54.5	129	. 143	403	116	108	108
								<10.0	49.4	49.1

Combe Fill South Chester, New Jersey Interim Environmental Monitoring – Round 2 Deep Well Monitoring

FILTERED METALS (ppb)	SAMPLE DATE	D-1 6/5/90	D-2 6/8/90	DW-4 6/7/90	D-7 6/5/90	D-8 6/6/90	D-9 6/6/90	D-7DUP 6/5/90	D-7MS 6/5/90	D-7MSDUP 6/5/90
aluminum	DATE	<200	<200	<200	<200	R	<200	<200	76%	87%
antimony		<60.0	<60.0	<60.0	<60.0	. R	<60.0	<60.0	89%	89%
arsenic		10.0	<10.0	<10.0	<10.0	<10.0	′<10.0	<10.0	88%	91%
barium		10.3	10.9	<10.0	333	R.	55.5	304	69%	82%
beryllium		<5.00	<5.00	<5.00	<5.00	R	<5.00	<5.00	92%	92%
cadmium		<5.00	<5.00	<5.00	<5.00	R	44.4	<5.00	83%	83%
calcium		10400	35800	32300	232000	R	159000	212000	0%	152%EX
chromium		<10.0	<10.0	<10.0	<10.0	· R	<10.0	<10.0	79%	79%
cobalt		<50.0	<50.0	<50.0	<50.0	R	<50.0	<50.0	78%	90%
copper		<25.0	<25.0	<25.0	<25.0	R	<25.0	<25.0	85%	85%
iron		<100	<100	21400	1470	. R	<100	1300	48%	86%
lead		R	R	R	R	R	R	R	Ř	R
magnesium		3560	9710	17500	108000	· R	76300	98600	0%EX	130%EX
manganese		<15.0	<15.0	674	4300	R	4570	3930	0%EX	99%
mercury		<0.20	<0.20	<0.20	< 0.20	R	<0.20	<0.20	<0.20	<0.20
nickel		<40.0	<40.0	<40.0	70.3	R	<40.0	51.5	77%	77%
perssium	•	<2000	2000	<2000	8170	Ŗ	4390	7920	90%	113%
selenium		<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	73%	84%
silver		<10.0	<10.0	<10.0	<10.0	R	<10.0	<10.0	81%	95%
sodium		4790	14500	8640	236000	R	79200	215000	0%EX	182% EX
thallium		<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	66%	66%
vanadium		<50.0	<50.0	<50.0	<50.0	R	<50.0	<50.0	69%	82%
zine		27.6	35.3	21.1	114	. R	358	. 114	81%	81%

Combe Fill South Chester, New Jersey Interim Environmental Monitoring – Round 2 Deep Well Monitoring

	SAMPLE	D-1	D-2	DW-4	D-7	D-8	D-9	D-7DUP	D-7MS	D-7MSDUP
INORGANICS	DATE	6/5/90	6/8/90	6/7/90	6/5/90	6/6/90	6/6/90	6/5/90	6/5/90	6/5/90
pН		6.3	6.4	<6.95	6.92	6.9	7.1	NA	NA	NA
TSS (mg/l)		8.1	<1.0	67.1	31.4	36.2	9.2	NA	NA	NA
TDS (mg/l)		83.9	224	193	2430	1900	1310	NA	NA	NA
specific conductance (umhos/cm)		103	481	342	3980	2960	2130	NA	NA	N _A
chloride (mg/l)		2.7	34	8.9	1000	650	420	NA	NA	NA
nitrate (mg/l)		<0.10	0.05 *	<0.10	<0.10	<0.10	<0.10	NA	NA	NA
CÓD (mg/l)		<10.0	<10.0	19.8	110	71.8	29.7	NA	NA	NA
TKN (mg/l)		0.48	0.27	0.44	9.64	4.28	1.1	NA	N.A	NA
ammonia (mg/l)		< 0.04	< 0.04	<0.04	3.84	1.97	0.07	NA	N.A	NA
sulfate (mg/l)		<10.0	20.2	<10.0	<10.0	<10.0	<10.0	NA	NA	NA
phosphorous (mg/l)		<0.15	<0.15	<0.15	<0.15	< 0.15	< 0.15	NA	NA	NA
BOD (mg/l)		· 1	<1.0	8	10	111	2	NA	NA	NA
total coliform bacteria (colonies/100	ml)	286	230	<1000	78 ·	2000	480	NA	NA	NA
fecal coliform bacteria (colonies/100	•	<1	<10.0	<100	8	. 1	48	NA	NA	NA

NOTE

- U- Indicates that the compound was analyzed for but not detected.
- J- The concentration listed is an estimate value.
- B- Indicates analyte was detected in the blanks as well as the sample.
- R- The analysis was rejected by NJDEP QAS during the validation process.
- NA- Not analyzed
- (2)- Data in parentheses are results from rerun of sample.

Tentatively identified compounds are not included in the tables.

- *- Sample was analyzed for nitrate plus nitrite
- MB- Method Blank
- TB- Trip Blank

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Compe Fill South Chester, New Jersey Interim Environmental Monitoring – Round 2 Field Blank Samples

	SAMPLE	MB	TB	FBW-1	МВ	TB	FBWS-1	MB	TB	FBW-2
VOLATILE ORGANICS (ppb)	DATE			5/30/90			5/30/90			5/31/90
Dilution Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
methylene chloride		4 J	U	Ú	41	U	U	2J	5B	3JB
acetone		6J	U	U	6J	U	U	U	5B	U
carbon disulfide		IJ	U	ប	- 11	U	U	U	-5B	U
benzene	1	Ú	U	U	. U	U	- U	U	5B	U
toluene		U	U	U	U,	U	U	U	5B	Ú
BASE NEUTRALS (ppb)										
Dilution Factor		2.00		2.04	2.00		2.00	2.00		2.00
di-n-butylphalate		U		υ	υ.		u	U		U

Combe Fill South Chester, New Jersey Interim Environmental Monitoring – Round 2 Field Blank Samples

VOLATILE ORGANICS (ppb)	SAMPLE DATE	MB	ТВ	FBWS-2 5/31/90	МВ	FBW-3 6/1/90	МВ	ТВ	FBW-4 6/4/90	MB	TB	FBWS-4 6/4/90
Dilution Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
methylene chloride		2J	5B	7	· U	υ	U	41	31	31	43	U
acetone		8J	5B	υ	Ų	160	U	U	U	U	U	บ
carbon disulfide	1	U	5B	U	· U	υ	U	U	. U	U	U	υ
benzene		U	5B	U	U	U	Ü	U	U	U	U	U
toluene		U	5B	U	U	U	U	U	U	U	U	U .
BASE NEUTRALS (ppb)							1					
Dilution Factor		2.00		2.20	2.00	2.00	2.00		2.06	2.00		2.04
di-n-butylphalate	-	U		21	U	U T	U		U	U		U

Compe Fill South Chester, New Jersey Interim Environmental Monitoring – Round 2 Field Blank Samples

	SAMPLE	MB	ТВ	FBGW-7		MB	TB	FBGW-8 6/7/90	MB	TB	FBGW-9 6/8/90
VOLATILE ORGANICS (ppb)	DATE			6/5/90	6/6/90			0///90			
Dilution Factor		1.00	1.00	1.00	NÁ	1.00	1.00	1.00	1.00	1.00	1,00
methylene chloride	-	4U	6(6)	4J(U)	-NA	ับ	10	15	U	U	5
acetone	}	7 J	5J(U)	38(53)	NA	71	2,1B	180B	U	Ü	26
carbon disulfide		U	U(U)	U(U)	NA	U	IJ	1.1	U	U	U
benzene	1	Ú	5(Ü)	4J(U)	NA	U	U	4J	U ·	U	9
toluene		U	U(U)	11(U)	·NA	U	U	n	U	U	21
BASE NEUTRALS (ppb)											
Dilution Factor		2.00		2.00	NA	2.00		2.06	2.00		2.06
di-n-hutylphalate		U	•	U	NA	U		U	U		U

Comoe Fill South Chester, New Jersey Interim Environmental Monitoring – Round 2 Field Blank Samples

	FBW-1	FBWS-1	FBW-2	FBWS-2	FBW-3	FBW-4	FBWS-4	FBGW-7	FB-6	FBGW-8	FBGW-9
UNFILTERED METALS (ppb)	5/30/90	5/30/90	5/31/90	5/31/90	6/1/90	6/4/90	6/4/90	6/5/90	6/6/90	6/7/90	6/8/90
aluminum	<200	<200	<200	<200	<200	<200	<200	1.00	NA	1.00	1.00
antimony	<60.0	<60.0	<60.0	<60.0	<60.0	<60.0	<60.0	<60.0	NA	<60.0	<60.0
arsenic	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	NA	<10.0	<10.0
barium .	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	NA	<10.0	<10.0
beryllium	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	NA	<5.00	<5.00
cadmium	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	NA	<5.00	<5.00
calcium	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	NA	<5000	<5000
chromium	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	NA	<10.0	<10.0
cobalt	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	NA	<50.0	<50.0
copper	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	NA	<25.0	<25.0
iron	<100	<100	<100	<100	104	172	<100	<100	NA	<100	<100
lead	, R	R	R	R'	R	R	R	R	NA	R	R
magnesium	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	NA ·	<1000	<1000
manganese	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0	NA	<15.0	<15.0
mercury	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	NΆ	<0.20	<0.20
nickel	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	NA	<40.0	<40.0
potassium	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	NA	<2000	<2000
selenium	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5:00	<5.00	N.A	<5.00	<5.00
silver	<10.0	<10.0	<10.0	<10.0	< 10.0	<10.0	<10.0	<10.0	NA	<10.0	<10.0
sodium	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	NA	<1000	<1000
thallium	<10.0	· <10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	NA	<10.0	<10.0
vanadium	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	NA	<50.0	<50.0
zinc	<20.0	30.4	<20.0	<20.0	×<20.0	<20.0	<20.0	<20.0	NA	<20.0	<20.0
cyanide	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	NA	<10.0	<10.0

Comoe Fill South Chester, New Jersey Interim Environmental Monitoring – Round 2 Field Blank Samples

•											
•	FBW-1	FBWS-1	FBW-2	FBWS-2	FBW-3	FBW-4	FBWS-4	FBGW-7	FB-6	FBGW-8	FBGW-9
FILTERED METALS (ppb)	5/30/90	5/30/90	5/31/90	5/31/90	6/1/90	6/4/90	6/4/90	6/5/90	6/6/90	6/7/90	6/8/90
aluminum	NA	NA	NA	NA	<200	NA	NA	<200	NA	<200	<200
antimony	NA	NA	NA	NA	<60.0	NA	NA	<60.0	NA	<60.0	<60.0
arsenic	NA	NA	NA	ŅA	<10.0	NA	NA	<10.0	NA	<10.0	<10.0
barium	NA	NA	NA	NA	<10.0	NA	NA	<10.0	NA	<10.0	<10.0
beryllium	NA	NA	N.A	NA	<5.00	NA	NA	<5.00	NA	<5.00	<5.00
cadmium	NA	NA	NA	NA	<5.00	NA	NA	<5.00	NA	. <5.00	<5.00
calcium	NA	N.A.	N.A.	NA	<5000	NA	NA	<5000	NA	<5000	<5000
chromium	NA	NA	NA	NA	<10.0	NA	NA	<10.0	NA	<10.0	<10.0
cobalt	NA	N.A.	NA	NA	<50.0	NA	NA	<50.0	NA	<50.0	<50.0
copper	NA	NA	NA	·NA	<25.0	NA	NA	<25.0	NA	<25.0	<25.0
iron	NA	NA	NA	NA	<100	NA	N.A	<100	NÁ	<100	<100
lead	NA	NA	NA	NA	R	NA	NA	R	NA	R	R
ıgnesium	NA	NA	NA	' NA	<1.000	NA	NA	<1000	NA	<1000	<1000
manganese	NA	NA	NA	NA	<15.0	NA	NA	<15.0	NA	<15.0	<15.0
mercury	NA	NA	'NA	NA	<0.20	NA	NA	<0.20	NA	<0.20	<0.20
nickel	· NA	N.A.	NA	, NA	<40.0	NA	NA	<40.0	NA	<40.0	<40.0
potassium	NA	NA	N.A	, NA	<2000	NA	NA	<2000	.NA	<2000	<2000
selenium	NA	NA	NA	NA.	<5.00	NA	NA	<5.00	N.A.	<5.00	<5.00
silver	NA	NA	NA	NA	<10.0	NA	NA	<10.0	NA	<10.0	<10.0
sodium	. NA	NA	NA	NA	<1000	NA	NA	<1000	NA	<1000	<1000
thallium	NA	N.A.	NA	NA	<10.0	NA	NA	<10.0	NA	<10.0	<10.0
vanadium	NA	ŅA	NA	NA	<50.0	NA	NA	<50.0	NA	<50.0	<50.0
zinc	NA	NA	NA	NA	<20.0	NA	NA	<20.0	NA	<20.0	<20.0

Comoe Fill South Chester, New Jersey Interim Environmental Monitoring – Round 2 Field Blank Samples

	FBW-I	FBWS-1	FBW-2	FBWS-2	FBW-3	FBW-4	FBWS-4	FBGW-7	FB-6	FBGW-8	FBGW-9
INORGANICS	5/30/90	5/30/90	5/31/90	5/31/90	6/1/90	6/4/90	6/4/90	6/5/90	6/6/90	6/7/90	6/8/90
pH .	. 6.6	NA	, NA	NA	6.41	7.9	NA.	5.67	NA	7.72	7.0
TSS (mg/l)	0.30	NA	NA	'NA	1.2	1.5	NA	2.1	NA	<1.0	5.00
TDS (mg/l)	<5.4	NA	ŃΑ	. NA	<2.5	7.5	NA	1.3	NA	1.2	<1.0
specific conductance (umhos/cm)	300	NA	NA	NA	0.50	1.2	NA	0.50	NA	2.1	74.3
chloride (mg/l)	<1.0	NA	NA	NA	<1.0	<1.0	NA	<1.0	NA	<1.0	<1.0
nitrate (mg/l)	<0.10	ŇΑ	NA	NA	NA	<0.10	NA	<0.02	<0.10	<0,10	<0.02*
COD (mg/l)	<10.0	NA	NA	' NA	<10.0	<0.1	NA	<10.0	NA	<10.0	<10.0
TKN (mg/l)	<0.02	NA	NA	NA	0.10	0.17	NA	0.88	NA	0.11	0.13
ammonia (mg/l)	<0.04	NA	NA	, NA	< 0.04	0.16	NA	< 0.04	NA	< 0.04	<0.04
sulfate (mg/l)	0.04	NA	NA	. NA	<10.0	1.66	NA	<10.0	NA	<10.0	<10.0
phosphorous (mg/l)	<0.15	, NA	NΑ	NA	< 0.15	0.01	NA	<0.15	NA	<0.15	<0.15
BODS (mg/l)	<1.0	NA	NA	NA	NA	<2	NA	<1	<1.0	<1	<1
total coliform (colonies/100ml)	<1	NA	NA	ŇΑ	<1	<1	NA.	<1	NA	<i< td=""><td><i< td=""></i<></td></i<>	<i< td=""></i<>
fecal coliform (colonies/100ml)	<1	NA	NA	NA	<1	<1	NA	<1	NA	<i< td=""><td><1</td></i<>	<1

U- Indicates that the compound was analyzed for but not detected.

Tentatively identified compounds are not included in the tables.

J- The concentration listed is an estimated value which is less than the specified minimum detection limit but is greater than zero.

B- Indicates analyte was detected in the blanks as well as the sample.

R- The analysis was rejected by NJDEP QAS during the data validation process.

NA- Not analyzed

⁽²⁾⁻ Data in parentheses are results from rerun of sample.

^{*-} Sample was analyzed for nitrate plus nitrite.

IX. Analyses of Raw Ground Water

48

TABLE 5 - 3

Combe Fill South Landfill Ground Water Treatability Study

•		. 6	73 PT-1	ć	78 PT-2	_			
•		26 he					23 PT-3 48 hr		75 PT-4 48 he
	DETECT				٠.				
MOLATILE CREMICE (POD)	LINIT								
chloroethane	10	u	u	13	12		· •	4	
methylene chloride	5	Ū	ŭ	_	_	_	• •	U	U
scatone	10	U	u		%		•	U	u
trans-1,2-dichloroethene	5	U	ŭ	4	4	_	•	U	U
chloroform	5	5	9	u		U	U	U	U
2-butanone	10	U	u	230	_	U	U	. 47	54
1,2-dichloropropane	5	U	U	33	ı L	•	U	Ü	U
benzene	5	5	10	16	15	U	U	u	U
4-methyl-2-pentanone	10	U	ı u	33	13 33.	U 	U	U	¥
2-hexanone	10	U	u	ᆲ	* 7	U	14	· u	. u
teluane	5	U	u.	190	150	U	44	U	u
chiorobenzane	5	22	33	52	130 47	•	U	u	U
ethyl benzene	5	u	u	73	6	U	U	Ü	U
total xylenes	5	U	Ü	13	- 13	U U	U	U	ָֿט
PESTICIDES AND PCSs (ppb)		. u	. • U	; U.		•	H	. u	Ų
METALS (ppb)		•	. •	•	·	· u		U	u
Alusinus									
antimeny		1738	75.48	,		1940	958	((U	4.444
arcinary arsanie		77 0	22JJ	126.1	129.5	220	330	85.4	440
barius		4.21	4.21	93.8	106	4.81.	4. <i>5</i> 1	4.81	125
berytt (us		1402	1918	•		638	634	12.23	4.21
cadrius Cadrius		1.51	1.51	4.33	2.98	1.53	1.50	1.51	75.88
calcius		I. 21	3. . 3U	8.9	9.4	3.50	3.50	6.6	4.33
chronium -		106000	153000 .	148000	153000	148000	116000	5920	9.2
cops(:		5.98	12.8	7.18	6.48	10.5		_	6120
COCOCC.		21.48	29.43		_	34.98	9.78 31.48	5.21 3.48	5.21
lou address		الا.(9.JI	9.33	79.7	9.31	9.31	9.31	4.23
lead		1350	8840	57100	54100	69100	70100	7.33 678	9.31
angnes (us		N .	SI.	3 1	37.2	SI	21	3/s	184
agudaueze 		7100	56200	69600	73100	75200	73800	25408	SU
oscern.		2200	19200			6520	6830		26508
nicket		21	.21	3		.21	.21	28.2	2. 3
potassius	1	2.41	12.44	12.41	201	12.44	12.41	.21	.21
Menius		7302	6670			17200	20908	12.4U 9478	12.44
silver		U	Ni Ni	350	35	SU	Si		10202
sodius		-7U	6.70	6.70	6.70	6.73	50 6.70	ານ 4 7:	SU .
that I fun		34000	341000	•	- 	23600		6.7U	6.70
Venadius	9	. tu	9. 1U	9. 1U	9. iu	9. IU	1130000	6080	6140
Zine .	4,	.Su	4.50			4.54	9.1U	9. 1U	9.10
Syanida Syanida	93	5. t	108	91.3	276.7	44.8	4.5U	4.50	4.5U
bjsvojs ekands		ک	100	100	100	10.00	51.3 10.00	23.0	12.38
	Я	_	SU	5 U			IU.ILI	104	100

Combe Fill South Landfill Ground Water Treatability Study

Analytical	Results f	COM 24	and 48	Hour A	quifer	Pump T	ests	
	CFS	PT-1	CF:	5-79 E	CFS	PT-3	cr	
	26 hr	48 hr	24 hr	48 hr	26 hr	48 hr	24 hr	48 hr

FILTERED METALS (ppb) aluminum 1838 729 347 440 440 44	
1818 729	
· · · · · · · · · · · · · · · · · · ·	
antimony 330 330 121.5 131 1 370 470 400	
arsenic 4-81 4-81 mm 4 mm	2
berius 225 220 4.81 4.81 4.	3 3
beryllium 1-51 1-51 2/5 6.98 8.	78
cachius 3.50 3.50 1.50 1.50 3.38 4.1	3B
calcius 149000 147000 147000 17 9.8 3.50 3.50 7 9.8	
chronius 30-1 17 8 40-4 156000 157000 20408 5920 594	
cobalt 30.48 29 50	
copper 9.31 0.71 0.71 0.71 2.23 2.23 2.23 3.5	
from 9.31 9.31 9.31 9.48 9.31 9.31 9.31 9.31	
lead 11900 21600 26900 · 53400 226 4.81 12.	
magnesium 시기에 되는 되는 되는 되는 되는 기를 되는 것이 되었다면서 되었다	
5500 5500 7500 76100 80300 5500 25700 250	ios.
7010 18.5 24.5 29	
nietei .टा .टा .टा .टा .टा .टा .टा	
12.41 12.41 12.41 12.41 12.41 12.41 12.41 12.41 12.41	
7490 7080 17700 17800 9038 980	
silver 30 SU SU SU SU SU SU SU	• .
Section 6-70 6-70 6-70 6-70 6-70 6-70 6-70 6-70	10
377000 337000 239000 1400000 A040 A050	
9.10 9.10 9.10 9.10 9.10 9.10 9.10 9.10	
2100 · 4.50 4.50 4.50 4.50 4.50 4.50 4.50 4.50	
124 133 104.1 363.9 61.7 5.18 4.88 17	
100 100 100 100	13
phenois SU SU SU SU SU	
PM 6.59 6.77 6.44 6.23 6.59 6.95	
TDS (mg/t) 26 26 3 12 60 27 1.0	
1507 1469 1364 1416 1314 1374 1374	Lo
chieside (miles/cm) 1970 2100 1870 1936 1950 2100	4
enteriors (mg/t) 647 gas 1930 5100	
mtrite (mg/t)	
	.5
mitrate (mg/t) 5.6 5.6 5.7 1 0.5 d.5 d	47
mitrate (mg/t) 5.6 5.6 5.7 1.8 2.7 3.0 0.45 0.	.9
TCH (May/1) 5.6 5.6 5.6 5.7 1.8 2.7 3.0 0.45 0. TCH (May/1) 3.99 2.24 2.8 2.7 3.0 3.5 3.7 3.8 3.7 3.8 3.7 3.8 3.8 3.8	
TCD (mg/t) 5.6 5.6 5.7 1.8 2.7 3.0 0.45 0. TCD (mg/t) 3.99 2.24 40.28 40.28 16.52 2.24 40.16 40	.14
## ## ## ## ## ## ## ## ## ## ## ## ##	-1
######################################	
Mitrate (mg/l) 5.6 5.6 5.7 1.8 2.7 3.0 0.45 0. TCH (mg/l) 161.6 161.6 116.7 144.4 126.6 135.3 11.8 7 ammonia (mg/l) 5.99 2.24 5.28 5.28 16.52 2.26 5.16 5.16 5.16 Sulfate (mg/l) 4.1 5.7 11.8 16.6 1.8 1.4 5.1 5.1 5.1 5.1 5.1 5.1 5.1 5.1 5.1 5.1	.1 .8 .0
TICH (mg/t) 5.6 5.6 5.7 1.8 2.7 3.0 0.45 0. TICH (mg/t) 161.6 161.6 116.7 144.4 126.6 135.3 11.8 7 semanta (mg/t) 4.1 40.1 40.1 40.1 40.1 8.35 1.43 40.1 40 sikatinity (mg/t) 440 448 485 523 595 596 22.0 28 TICH (mg/t) 133 46 329 466 223 51 1.0 1	.1 .8
Title (mg/t) 5.6 5.6 5.7 1.8 2.7 3.0 0.45 0. Title (mg/t) 3.99 2.26 40.28 40.28 16.52 2.26 40.16 40 sulfata (mg/t) 2.4 3.7 11.8 16.6 1.8 1.6 4.4 3 sulfata (mg/t) 440 448 485 523 595 596 22.0 28 Title (mg/t) 133 46 329 466 223 51 1.0 1 108sphorous (mg/t) 1.48 40.2 0.315 40.7 70.7 58.5 12.3 10	.1 .8 .0 .0
Title (mg/t) 5.6 5.6 5.7 1.8 2.7 3.0 0.45 0. Title (mg/t) 3.99 2.24 40.28 40.28 16.52 2.24 40.16 40 sulfata (mg/t) 2.4 3.7 11.8 16.6 1.8 1.6 4.4 3 sikalinity (mg/t) 440 448 485 523 595 596 22.0 28 Title (mg/t) 133 46 329 464 223 51 1.0 1 10sphorous (mg/t) 1.48 40.2 0.315 40.2 1.30 0.59 0.82 0.5	.1 .8 .0 .0
TICH (mg/t) 5.6 5.6 5.7 1.8 2.7 3.0 0.45 0. TICH (mg/t) 161.4 161.4 116.7 144.4 126.6 135.3 11.8 7 summaria (mg/t) sulfate (mg/t) dult dult dult dult 8.35 1.43 dult dult dult dult dult dult dult dult	.1 .8 .0 .0

U - Undetected
B - Also Detected in Blank

J - Detected, but Below Method Detection

TABLE 5-4

COMBE FILL SOUTH LANDFILL GROUND WATER TREATABILITY STUDY

GROUND WATER CHARACTERISTICS (1986, 1988, 1989)

			•	t i	JEN	IP	Aqui fer	Pump Test			Treatability	Study		
COMPOUND		Detection Limit (YORK)	8-1(PT-3) 5/86 (LMSE)	8-3(PT-2) : 5/86 (LMSE)	8-1(PT-3) 12/88	5-3(PT-2) 12/88	12/1/88	PT-3* 12/1/86 (STING)	COMP. PT-2/PT-3** 3/27/89 (YORK)	COMP. PT-2/PT-3** 4/17/89 (YORK)	COMP. PT-2/PT-3** 5/05/89 (YORK)	COMP. PT-2/PT-344 5/19/89 (YORK)	COMP. PT-2/PT-3** 6/02/89 (YORK)	COMP. PT-2/PT-3** 6/15/89 (YORK)
hloroethane	ug/l	10	U	10J	U	U	13	U	Ú	U	U	U	U	<u>_</u>
tethylene Chloride	84	5	56	18.4	31	U	100	1,1	6	5	4.18	3.1	ū	, ũ
cetone		10	-	•	240	Ü	90	13	•	Ü	U	ű	ŭ	, <u>n</u>
arbon Disulfide	•	5	-	•	31	Ü	•	•	•	-	-	ŭ	ŭ	ű
'inyl Acetate	•	10	-	•	11	Ù	•	•	•	•		Ü	ü	ŭ
-1,2-Dichloroethene		5	U	8.02	•	•	4.1	U	. •		Li	ũ	ű	ü
,1-Dichloroethane	44	5	65.2	51.4	•	•	Ü	Ū	U	ŭ	ũ		ü	ü
. 2-Dichloroethane	**	5	U	U	-	•	Ū	Ũ	ū	ũ	41	22	22	ű
richloroethylene	•	5	U	4.04	:•	:-	Ū	. Ū	Ū	ũ	ü	ū	- 11	ii ii
etrachloroethylene	•	5	U	4.11	•	•	U	. Ü	Ū	ũ	ŭ	ű	7	
:-Butanone		10	•	•	•	•	230	Ū		ū	ŭ	ŭ	ũ	
,2-Dichloropropene	•	5	u	Ĺò	-	•	31	. u	ü	ũ	ŭ	ŭ	ŭ	
ienzene		5	4.7	80.2	44	Ü	16	· Ü	10	10	ž	Ā	LA .	31
Hethyl -2-Pentanone	•	10	•	-	32	u	33	· ū	•	Ü	ŭ	ŭ	10	11
!-Hexanone		10	-	-	Ĺò	Ü	8.1	Ū	•	ũ	ŭ		ü	ŭ
oluene	•	5	1370	68.2	130	Ū	190	ü	- 42	42	57	42	12	28
hlorobenzene	•	5	U	21.1	27	Ū	52	ŭ	25	25	17	15	18	14
thylbenzene	*	5	u	7.23	12	ü	7.1		5	5	11	27		21
otal Xylenes	4	5	•		33	ũ	13x	·			**	4	11	41
inyl Chloride	•	10	U	101	-	_	Ü	. Ū	U	U	U	ű	ŭ	Ü
·H	s.u.	•	•	•	6.4	6.1	6.4	6.5	6.2	•	•	•	<u>.</u>	
SS	mg/t	•	-	-	217	99	3	. 60	330	21	18	18	19	47
DS	•	•	, -	-	1454	2396	1364	1314	•	-			•	
OC	•	•	•	•	-	-	145.8	70.7	58	61	52	11	57	181
00	88	•	•	- 1	113.2	863.8	116.6	126.6	•	•	•	-	•	
1005	**	•	•	-	- 64	530	88	<10	61	58	55	9	53	45
amonta	*	•	•	•	<0.1	<0.1	<0.1	8.35	8.8	8.8	8.18	8.9	12.5	. 11.6
KN	84	•	•	-	2.17	<0.28	<0.28	16.52	•	-	•	•	•	•
•		•		•	0.96		0.315	1.3	•	•	•	•		

^{*} Samples collected during pump test (24 hr).
** Samples collected for treatability studies & composited at equal volume.

U Undetected

J Detected but less than method detection limit

B Also detected in Blank

X. Percolation Test

MEMO TO THE FILES

FROM:

T.R. Satori

RE:

Combe Fill South Landfill -

Sewage Disposal Field

Percolation Tests

FILE:

3013.012 #3

DATE:

September 10, 1991

CC:

S.J. Roland R.L. Hovey S.W. Anagnost

On August 7, 1991 Thomas Satori and Steven Pernick arrived on the abovementioned site at 0900 hours. The four corners of the proposed sewage disposal field were established in the field by surveyors for Taylor. Wiseman, and Taylor on August 6, 1991. Jesse Robins, of the NJDEPE, was present during the surveying. Three percolation test pits were excavated by hand using pick-axes, shovels, and post hole diggers at locations within the proposed sewage disposal field (see attached Figures). The pits were 24 inches square from 0" to 10" below grade and 8 inches diameter from 10" to 24" below grade. As prescribed by N.J.A.C. 7:9A the pits were pre-soaked as shown in the tables below. Percolation test pit #1 passed the 60-minute pre-soak; percolation test pits #2 and #3 did not pass the 60-minute pre-soak and were subsequently soaked for an additional four hours.

Pre-Soak for Percolation Test #1:

<u>Time</u>	Distance From Top of Board to Water Level	Depth of Water	Rate of <u>Fall</u>	Description
11:16	2"	12"	•••	First water fill in hole
11:21	8"	6"	6"/5 min.	
11:26	9"	5"	1"/5 min.	
12:01	***	0"	5"/35 min.	Water drained in 45 min.
12:12	2"	12"		Second water fill in hole
13:12	•••	0" .	12"/<60 min.	Water drained <60 min.; presquk complete

MEMO TO THE FILES

FROM: T.R. Satori

RE: Combe Fill South Landfill -

Sewage Disposal Field

Percolation Tests

FILE: 3013.012 #3

DATE: September 11, 1991

CC: S.J. Roland

R.L. Hovey S.W. Anagnost

On August 8, 1991 Thomas Satori and Ronald Hovey of O'Brien & Gere met with Jesse Robins of the NJDEPE to perform three percolation tests. Samara of the Chester Township Board of Health was notified on Monday August 5, 1991 of the percolation tests but could not find the location of the test once inside the landfill on August 8, 1991. Ben had said that he would arrive between 10:00 and 10:30am. Since he had not arrived by 10:45, we began preparing the holes for the percolation tests. The test pits were scraped to remove silt deposited during pre-soak. Each hole was filled with water to a The drop in water level was then measured at 5 minute level of 7 inches. intervals until 3 successive measurements gave the same drop in water level. After each 5 minute measurement, the hole was refilled to the 7 inch water level. After obtaining 3 similar successive rates each pit was filled to a water level of 7 inches and the time was recorded when the water level had dropped to 1 inch. The percolation rate was then calculated by taking the difference in time for a 6 inch drop in water level and dividing by 6 inches.

The following tables contain the data for the percolation tests:

Percolation Test #1

Time <u>Start</u>	Time <u>End</u>	Depth of Water Start of Interval (inches)	Top of Board to Water (inches)	Depth of Water End of Interval (inches)	Drop in Water Level (inches)
10:47	10:52	7	_. 9.3	4.7	2.3 = 9.3 - 7.0 =
10:53	10:58	. 7	× 8.8	5.2	1.8 = 8.8-7.0
11:00	11:05	7 .	7.9	6.1	0.9 = 29-70
11:06	11:11	· 7	8.6	5.4	1.6 = 8.6-7.0

Memo to the Files September 11, 1991 Page 2

Time Start	Time <u>End</u>	Depth of Water Start of Interval (inches)	Top of Board to Water (inches)	Depth of Water . End of Interval (inches)	Drop in Water Level (inches)
11:12	11:17	7	8.5	5.5	1.5
11:18	11:23	7	8.5	5.5	1.5
11:24	12:11	7	13	1	6

The following summarizes the results of Percolation Test #1:

- Test date: 8/8/91 1.
- Depth of hole: 14 in. 2.
- Pre-soak: Shortened; 59 minutes for 12 inches to drain after second filling.
- Rate of Fall data, time interval: 5 minutes
- 5. Percolation rate:
 - a. Time required for 6 inch drop in water level: 47 minutes b. Percolation rate: 47 min./6 in. = 8 min./in.

Percolation Test #2

Time Start	Time End	Depth of Water Start of Interval (inches)	Top of Board to Water (inches)	Depth of Water End of Interval (inches)	Drop in Water Level (inches)
11:26	11:31	7	7.7	6.3 ·	0.7
11:32	11:37	7	7.5	6.5	0 .5
11:38	11:43	7	7.5	6.5	0.5 ·
11:44	11:49	7	7.4	6.6	0.4
11:50	14:25	7	13	1	6

Memo to the Files September 11, 1991 Page 3

The following summarizes the results of Percolation Test #2:

- 1. Test date: 8/8/91
- 2. Depth of hole: 14 in.
- 3. Pre-soak: 4-hour pre-soak completed, test hole drained within 17 hours
- 4. Rate of Fall data, time interval: 5 minutes
- 5. Percolation rate:
 - a. Time required for 6 inch drop in water level: 155 minutes
 - b. Percolation rate: 155 min./6 in. = 26 min./in.

Percolation Test #3

Time Start	Time <u>End</u>	Depth of Water Start of Interval (inches)	Top of Board to Water (inches)	Depth of Water End of Interval (inches)	Drop in Water Level (inches)
11:55	12:00	7	8.5	5.5	1.5
12:01	12:06	7	,8 .5	5.5	1.5
12:07	12:12	7	8.5	5.5	1.5
12:13	13:40	7	13	1 .	6

The following summarizes the results of Percolation Test #3

- 1. Test date: 8/8/91
- 2. Depth of hole: 14 in.
- 3. Pre-soak: 4-hour pre-soak completed, test hole drained within 17 hours
- 4. Rate of Fall data, time interval: 5 minutes
- 5. Percolation rate:
 - a. Time required for 6 inch drop in water level: 86 minutes
 - b. Percolation rate: 86 min./6 in. = 14 min./in.

Memo to the Files September 11, 1991 Page 4

The results of the percolation tests fall within the acceptable percolation rate range of 3 min./in. to 60 min./in. Therefore, the disposal field can be located as shown in the attached figures ("Percolation Test Hole Locations" - which shows the locations of the Percolation Test Holes, and "Proposed Final Grading Plan - which shows the general location of the proposed treatment plant and disposal field). However, the disposal field should be designed using the slowest percolation rate of 26 min./in. as outlined in N.J.A.C. 7:9A. Copies of the Health Department Percolation Test Data Sheets are included. A copy of the Township of Chester, Board of Health Individual Sewage Disposal System application is also attached for reference purposes. This form should be completed by the Contractor prior to construction as part of the building permitting process.

Due to his absence, Mr. Samara, Chester Township Board of Health was notified by telephone upon completion of the percolation tests. He indicated that the results would be acceptable.

/kac

PERCOLATION TEST REPORTS

Board of Health, Township of Chester Morris County, New Jersey

PERCOLATION	TEST	RE	PORT
Sheet	1 (οť	6

BOARD OF HEALTH, TOWNSHIP OF CHESTER MORRIS COUNTY, NEW JERSEY

PROPERTY	IDENTIFICAT	ION: Lot 7 Block 17 Sheet	
Owner:	CERCLA Site	Address Trenton, N.F. 08625 Tel (609) 984-0	2 2.
Purchaser	•	AddressTei	
INSTRUCT!	ONS: A reports of all the Attach a ndicate dir	ort of each percolation test shall be submitted to the Board of Health ests performed shall be strictly in accordance with the requirements of map showing the location of <u>all</u> percolation tests and observation test ection and approximate percent of slope in area proposed for sewage	•
GENERAL !	NFORMATION:		
Rainfall, General (Surface (preceding Condition of Crainage in	Test 8-8-91 Sunny 75°F 5 days	
<u> </u>	PTH	SOIL DESCRIPTION	1
From	To	(Color, texture, water content, firmness, relative permeability	
0"	4"	Grev Loam	
4"	24"	Silty Red - Brown Material	
		Example: Lt. brown silty gravel, moist, dense - permeable	
SEEPAGE A	ND GROUNDWA	FER_	
	PTH	RELATIVE AMOUNT OF SEEPAGE INTO HOLE (Indicate rapid, moderate, slow, very slow)	
From	То	•	İ
ייח	24"	No Detectable Seepage Observed	
	Estimat	stabilized water table: NA after hours. ed depth to highest fluctuating or seasonal water table: 27 Feet mottled soil (grey streaked or marbled appearance): NA From	
. •	•	The state of the s	(
S	OIL MAP CODE	SOIL NAME	

Diameter of Test ench) 10" Approx. 7" Water sed Depth (min.) Change (////////////////////////////////////	Depth) DATE 8-8-91 Rate (min/inch) 7///////////////////////////////////
DATE_Diameter of Test ench) 10" Approx. 7" Water sed Depth (min.) Change (////////////////////////////////////	Depth) DATE 8-8-91 Rate (min/inch) ///////////////////////////////////
Approx. 7" Water Seq Depth (min.) Change (////////////////////////////////////	Depth) DATE 8-8-91 Rate (min/inch) 7///////////////////////////////////
Approx. 7" Water Seq Depth (min.) Change (////////////////////////////////////	Depth) DATE 8-8-91 Rate (min/inch) 7///////////////////////////////////
Depth (min.) Change (////////////////////////////////////	Rate (min/inch) ////////////////////////////////////
min.) Change (////////////////////////////////////	me (min/inch) 3 1/8 3 1/3 3 1/3 me DATE 8-8-91 9 (min/inch)
n 1.6 n 1.5 n 1.5 Minute Refill Ti	3 1/8 3 1/3 3 1/3 DATE 8-8-91 9 (min/inch)
n 1.5 n 1.5 Minute Refill Ti	3 1/3 3 1/3 me DATE 8-8-01 9 (min/inch)
n 1.5 n 1.5 Minute Refill Ti	DATE 8-8-01 e (min/inch)
n 1.5 Minute Refill Ti	DATE8-8-01 e (min/inch)
Minute Refill Ti	DATE 8-8-01 e (min/inch)
ie (înches) i Rat	DATE 8-8-01 e (min/inch) ////////////////////////////////////
<u>le (inches) Rat</u>	e (min/inch) ////////////////////////////////////
	-
Water Depth:	1"
Water Depth:	\ 7"
ange in Depth:	6" (normally 6")
me in accordance	roundwater determination with the procedures
Code of New Jerse	
_	September 25, 1991
re Inc Tal.	(908) 225-7380
	837
	Date 33629 eers Inc. Tel. son New Jersev 08

PERCOLATION	TEST	REPORT
Sheet	3 (of 6

BOARD OF HEALTH, TOWNSHIP OF CHESTER MORRIS COUNTY, NEW JERSEY

PROPERTY	IDENTIFICAT	FION: Lot Block Sneet	
Owner:	CERCLA Si	Bureau of Site Management 401 East State Street, CN 413	Tel (609) 984-0226
Guerrases	• •	Address	Tel
The resul	Attach a ndicate di	port of each percolation test shall be submitted to the tests performed shall be strictly in accordance with the map showing the location of <u>all</u> percolation tests and test area properties.	observation test
GENERAL I	NFORMATION		
Date of P	Percolation	Test 8-8-91 Date of Recording Observation Test	loie <u>8-7-91</u>
Weather C	ate of Tes	Sunny 75 F 5 days 0.08 in.; Raintail, preceding 5th thru 10th	GZV trace
Rainfall,	preceding	Surface Soil: Dry X Moist Wet Saturation	irated
Surface D	cainage in	Test Hole Area: well-drainedFooriy drain	160
Jul 1200 B	,, 4,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	y moderately well-drained to	mporary ponding
OBSERVATI	ON TEST HO	E - DESCRIPTION OF SOIL: OBSERVATION TEST HOLE NO).:
-		SOIL DESCRIPTION	
	РТН Го	(Color, texture, water content, firmness, rela	tive permeability
From	10	(00101, 100101)	
0"	4"	Grey Loam	
4"	24"	Silty Red - Brown Material	
			·
	 		
	1		
		Example: Lt. brown silty gravel, moist, dense - perm	neable
SEEPAGE A	ND GROUNDW	ATER .	
. DF	PTH	RELATIVE AMOUNT OF SEEPAGE INTO HOLE	
From	To	(Indicate rapid, moderate, slow, very slow)	
0"	24"	No Detectable Seepage Observed	
	Fetima	ro stabilized water table: NA after hours. red depth to highest fluctuating or seasonal water table mottled soil (grey streaked or marbled appearance): Fr m to to	le: <u>27 Fee</u> t
,		From to	58 8
cr	NAP COD	SOIL NAME	

SOIL MAP CODE

INSTRUCTIONS: Tests should be performed at various depths at each Observation Hole Location. Relate percolation tests PERCOLATION TEST REPORT test holes as follows: !-A, !-B, 2-A, 2-B, etc. Sheet 4 of 6 TWIE: Use separate sheet for each percolation test.) DATE 8-7-01 PERCOLATION TEST NO. 24 Distance below surface to bottom of test hole 24" Diameter of Test Hole 8" Distance below surface to top of test hole (if in trench) 10" SATURATION: DATE 8-7-91 CONSTANT RATE TEST: (Approx. 7" Water Depth) DATE 8-8-91 Initial Saturation Rate Depth Elapsed Deoth (full hole) (min/inch) Change (in.) Time (min.) Time Water Depth Time (In.) 711 1132 11 " Start 1130 10 5 Min. 7_1/2 " 1137/ 1135 6.5 1138 711 1140 10 0.5 5 Min. 1143/ 6.5 -1144 211 1230 8 1/3 0.6 Maintain 12" Depth For 5 Min. * Idcludes One Minute Refill Time 1149 6.6 Remove silt and clean out hole. DATE 8-8-91 (Approx. 7" water depth) PERCOLATION TEST: Elapsed Time (min) | Depth Change (inches) | Rate (min/inch) Time | Depth 7 50 25 5/6 6" 155 1425 Water Depth: End of Test: Time 1425 ۱ ۱ ۱ ۱ ۱ Water Depth: Time 1150 Beginning of Test: Total Elapsed Time: 6" (normally 6") Change in Depth: Percolation Rate: 25.8 min/inch I hereby certify that the percolation tests and the soil, rock, and groundwater determinations of which the above results are set forth were made by me in accordance with the procedures established in the Individual Sewage Disposal System Code of New Jersey (Rev. 1978.). Date September 25, 1991 Signed Professional Engineer, Lic. No. 33629 Engineering Firm O'Brien & Gere Engineers, Inc. Tel. (908) 225-7380 Address Raritan Plaza I, Edison, New Jersey 08837 (seal) 3

PERCOLATION	TEST	RE	PORT
Sheet	5_	of	

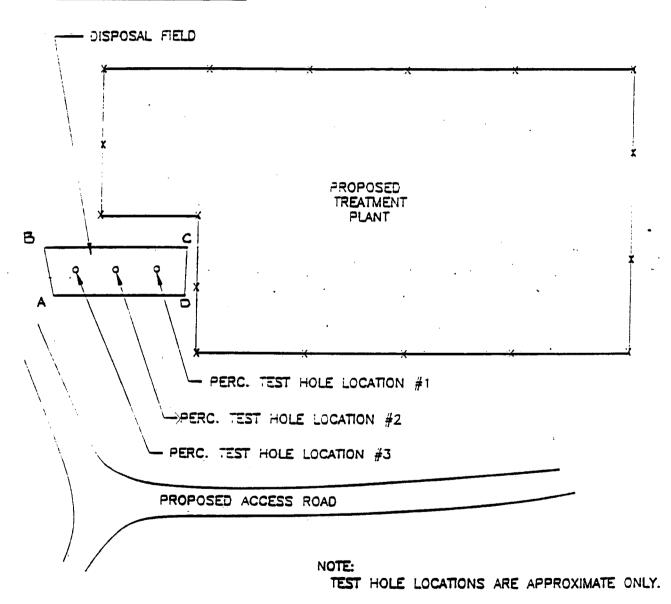
BOARD OF HEALTH, TOWNSHIP OF CHESTER MORRIS COUNTY, NEW JERSEY

PROPERTY	IDENTIFICAT	TION: Lot 7 Block 17 Sheet	
0	CERCI L Cin.	TON: Lot 7 Block 17 Sheet Byreau of Site Management 413 AddressTrenton, NJ 08625 Tel (609) 98.	<u>4-022</u> 6
Owner: _	CERCLA SIE	Address	
		Address fel	
The result	ts of <u>all</u> t Attach a ndicate dir	ort of each percolation test shall be submitted to the Board of Ho ests performed shall be strictly in accordance with the requirement map showing the location of <u>all</u> percolation tests and observation ection and approximate percent of slope in area proposed for seway	test
GENERAL II	NFORMATION:		
Date of Pe Weather Da Rainfall, General Co Surface Dr	ercolation ate of Test preceding andition of rainage in	Test 8-8-91 Date of Recording Observation Test Hole 8-7-91 Sunny 75°F 5 days 0.08 in.; Rainfall, preceding 5th thru 10th day trace Surface Soil: Dry X Moist Wet Saturated Test Hole Area: well-drained Poorly drained X moderately well-drained temporary ponding E - DESCRIPTION OF SOIL: OBSERVATION TEST HOLE NO.: 3	_ Ing
		SOIL DESCRIPTION	
	To	(Color, texture, water content, firmness, relative permean	lity
r rom	4"		
0"	4	Grev Loam	
411	24"	Silty Red - Brown Material	
		Example: Lt. brown silty gravel, moist, dense - permeable	
SEEPAGE AM	ND GROUNDWA		
DEF	HTC	RELATIVE AMOUNT OF SEEPAGE INTO HOLE	}
From	To	(Indicate rapid, moderate, slow, very slow)	
0"	24"	No Detectable Seepage Observed	
	Estimat	o stabilized water table: NA after hours. ed depth to highest fluctuating or seasonal water table: 27 Feet o mottled soil (grey streaked or marbled appearance): NA From to	
•	•	from to	500
SO	IL MAP CODE	SOIL NAME	

INSTRUCTIONS: Tests should be at each Observation Hole Locat test holes as follows: I-A	tion. Relate pe	ALCOISTION LESTS	PERCOLATION Sheet	N TEST REPORT
(NOTE: Use separate sheet for	each percolati	on test.)		
PERCOLATION TEST NO. 3A			DATE	
Distance below surface to bott Distance below surface to top Depth of small test hole if in	of test hole (t in tranch,	r of Test Hole	8"
SATURATION: DATE 8-7-91 Initial Saturation	CONSTANT RATE	EST: (Approx.	7" Water Depth	
(full hole)	Depth Time (in.)	Elapsed Time (min.)	Depth Change (In.)	Rate (min/Inch)
Time Water Depth		///////////////////////////////////////	(//////////////////////////////////////	
STAFT	1155 7"	5 Min.	1.5	31/3
1137 7 1/2" *	1201 5.5			
1142 6.1/2"	1206/ 5.5	5 Min.	1.5	3 1/3
1232 2 1/2"	1207	5. Min.	1.5	3 1/3
Maintained 12" Depth	1212 5.5	* Includes O	ne Minute Refil	1 Time
Time Depth Elapsed		6"	hes) Rate (mi	4.5
End of Test: Ti	,		r Depth:7 r Depth:\1	
Beginning of Test: Ti Total Elapsed Time:	87			" (normally 6")
Percolation Rate: 1/4 ! hereby certify that the perconstruction of which the above results are established in the Individual Signed Professional Engineering Firm	s min/inch colation tests a set forth were Sewage Disposa Lingineer, Lic	System Code of System	ock, and ground accordance with New Jersey (R. Date Septeration of the Control of	water determinations h the procedures ev. 1978.).
15				3
				551
•				

Coordinates and Elevations of Extent of Proposed Sewage Disposal Field

Coordinates			•			
Come	ĹΙ	North		East	7	Elevation
A	1	705514	Ţ	1980512	1	332.0
В	1	705530	İ	1980536	i	332.9
C	1	705430	1.	1908536	İ	338.0
D	į	705424		1980512	i	335.0



PERCOLATION TEST HOLE LOCATIONS

COMBE FILL SOUTH LANDFILL SUPERFUND SITE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

NOT TO SCALE

XI. RI/FS Health & Safety Monitoring Report Daily Logs

APPENDIX I HEALTH AND SAFETY MONITORING REPORTS

Date: 11/13/84

Background HNU Reading (Measured at Trailer): 0.8 ppm
Background EXP Reading (Measured at Trailer): 07.

Background RAD Reading (Measured at Trailer): 03 mr/hr
Work Area and Task: Air Rotary drilling ot D-1

Ambient HNU Readings (Measured in Working Area): Oppm

Ambient EXP Readings (Measured in Working Area): 07.

Ambient RAD Readings (Measured in Working Area): 0-.03 mr/h.

Level of Protection Required: Level D

Comments: No anomalous readings during drilling.

On-Site Health and Safety Officer: giffing & Thompson (REWAI)

Date: 11/14/84

Background HNU Reading (Measured at Trailer): 0.8 ppm

Background EXP Reading (Measured at Trailer): 0%

Background RAD Reading (Measured at Trailer): .03 mg/hr

Work Area and Task: Air Rotory Drilling (ARD) of Well D-1
Soil Boring / Rock Coring (58/RC) of 58-3

Ambient HNU Readings (Measured in Working Area): ARD: Oppm SB/RC: 0-3.2 ppm

Ambient EXP Readings (Measured in Working Area): ARD: 073
SE/RC: 076

Ambient RAD Readings (Measured in Working Area): ARD: 0-.03 mm/hm

5B/RC: 0-.03 mr/h

Level of Protection Required: ARD required Level B

SB/RC required Level D

Comments: On 38-3 on HNU reading taken inside the augere around 4-6' showed nearly 50 ppm; however, when measurment was taken above augers a reading of only 3-5 ppm resulted. Ambient working area was below 5 ppm so Level D used. Eventually the high readings inside the augers also subsided.

On-Site Health and Safety Officer: Jeffer . Thompson (REWAI)

Date: 11/15/84

Background HNU Reading (Measured at Trailer): 0.5 ppm

Background EXP Reading (Measured at Trailer): 0-17.

Background RAD Reading (Measured at Trailer): .02 mr/hr

Work Area and Task: Air Rotory Drilling at Well D-1 Soil Boring / Rock Coring at SB-3

Ambient HNU Readings (Measured in Working Area): ARD: Oppm

SB/RC: 0-16.5 ppm

Ambient EXP Readings (Measured in Working Area): ARD:07.

58/RC: 0-100%

Ambient RAD Readings (Measured in Working Area): ARD: no readings (NR)

SB/RC: 0-.02 mir/nr

Level of Protection Required: ARD required Level D

SB/RC required Level C and Level D (masely Level C).

Comments: Most of the very high readings were occurring around the auger heads on 58.3, so any work done in this vicinity was on Level C as detailed in HASP. When working further away from rig or when HUU levels dropped and stayed below Sppm Level D was resumed.

Both drillers and geologist are an Level C.

On-Site Health and Safety Officer: Affing & Thompson (REWAT)

Date: ///16/85

Background HNU Reading (Measured at Trailer): NR

Background EXP Reading (Measured at Trailer): NR

Background RAD Reading (Measured at Trailer): NR

Work Area and Task: Air Rotory Work at Well D-1 Soil Boring/Rock Coring at SB-3

Ambient HNU Readings (Measured in Working Area): ARD: NR

SB/RC: 0-6.0 ppm

Ambient EXP Readings (Measured in Working Area): ARD: NR

SB/RC:0%

Ambient RAD, Readings (Measured in Working Area): ARD: NR

SB/RC: NR

Level of Protection Required: ARD required Level D (determined from

previous work).

SB/RC required Level C and Level D

Comments: On SB/RC Level C was required while augming through the soprolite. Readings were greatest around the augen heads.

On Site Health and Safety Officer: Affrey S. Thompson (REWAI)

Date: 11/19/84

Background HNU Reading (Measured at Trailer): Oppm

Background EXP Reading (Measured at Trailer): 0%

Background RAD Reading (Measured at Trailer): NR

Work Area and Task: Air Rotory Drilling of Well D-1

Soil Boring Rock Coning at SE-3 (coning)

Ambient HNU Readings (Measured in Working Area): ARD: 0-0.2 ppm

Ambient EXP Readings (Measured in Working Area): ARD: 0%

Ambient RAD Readings (Measured in Working Area): ARD: 0-.03 mc/hc

Level of Protection Required: ARD required Level D

SB/RC required Level D

Comments: While constructing piezometer in 58-3 some low level (1-6ppm) HOU readings occurred (especially while installing sonal pack). These recallings were not at high enough levels for a long enough period of time to womant Level C. I left decision up to Ron weaver and drillers.

On-Site Health and Safet suricer: Jeffuy 3. Thompson (REWAI)

Date: 11/20/84

Background HNU Reading (Measured at Trailer): 0-1 ppm

Background EXP Reading (Measured at Trailer): 0-17

Background RAD Reading (Measured at Trailer): .02 mr/hr

Work Area and Task: Air Rotory Rig stuck so no work.

Soil Boring/Rock Coring at SB-2

Ambient HNU Readings (Measured in Working Area): ARD: NR SB/RC: 0-2.0 ppm

Ambient EXP Readings (Measured in Working Area): ARD: NR

Ambient RAD Readings (Measured in Working Area): ARD: NR

SB/RC: 0-.02 mr/hr

Level of Protection Required:

ARD required Level D (no intrusive work) SB/RC required Level D

Comments: ARD spent day cleaning up at D-1, steem cleaning at Command Post, and being stuck while trying to get to site D-s.

On-Site Health and Safety Officer: Jeffey S- Thompson (REWAT)

Date: ///2//84

Background HNU Reading (Measured at Trailer): 2.0 pm

Background EXP Reading (Measured at Trailer): 0%

Background RAD Reading (Measured at Trailer): .02 mr/hr

Work Area and Task: Air Robery Drilling at Well D-5 Soil Boring /Rock Coring at SB-2

Ambient HNU Readings (Measured in Working Area): ARD: 0-24 ppm SB/RC: 0 - 5.4 ppm

Ambient EXP Readings (Measured in Working Area): ARD: 0-157

SB/RC:0%

Ambient RAD Readings (Measured in Working Area): ARD: 0-.04 mr/hr SB/RC: 0

Level of Protection Required: ARD required Level D

SB/Rc required Level C and Level D (level a protection was used for soil sompling; once coning started, reading: allowed Level D).

Comments: 15% explosive occurred for a very short time near 10' in D-5. Monitoring showed this fell off shortly after 10'.

On-Site Health and Safety Officer: July 8. Thompson

Date: 11/2G/84

Background ENU Reading (Measured at Trailer): 0.8 pp.

Background EXP Reading (Measured at Trailer): 0-5%

Background RAD Reading (Measured at Trailer): .03 mc/hc

Work Area and Task: Air Rotory Drilling of Well D-5

Soil Boring / Rock Coring at SB-Z (piezometer)

Ambient HNU Readings (Measured in Working Area): ARD: 0-1.4ppm

SB/RC : NR

Ambient EXP Readings (Measured in Working Area): ARD: 5-30%

SE/RC: NR

Ambient RAD Readings (Measured in Working Area): ARD: 0-.03 mc/hc

SB/RC: NR

Level of Protection Required:

ARD required Level D 28/RC required Level C and D

Comments: EXP was closely monitored on D-s and most of time remained around 5%. (30% was a peak).

Level c used during construction on SB-2 due to previous HNU readings (IVEV84) and inevollability of HNU for RCW; use.

On-Site Health and Safety Officer: July 8- Thompson (REWAI)

Date: ///27/84

Background HNU Reading (Measured at Trailer): 0-1ppm

Background EXP Reading (Measured at Trailer): 0%

Background RAD Reading (Measured at Trailer): 0-.03 mr/hr

Work Area and Task: Air Rotary work of D-5 (installing esing)
Soil Boring/Rock Coning of St. 4

Ambient HNU Readings (Measured in Working Area): ARD: NR

52/RC: 0-5.0 ppm

Ambient EXP Readings (Measured in Working Area): ARD: 5-10%

SE/RC: NR

Ambient RAD Readings (Measured in Working Area): $\alpha_{RD:NR}$

SE/RC: 0-0.3 mr/hr

Level of Protection Required:

ARD required Level D

SB/RC: readings show only level D required but Rew decided to follow Level C.
Drillers followed Level D.

Comments: ARD: tender truck stuck much of duy. Once work began cosing was installed to 90' and gouted. Exp readings returned to 0% after this step.

Lorry Hoyt (surveyor) on site to lock around. I told him to follow Level D protection. (He was stoying on rounds).

On-Site Health and Safety Officer: Suffer & Thempson (Reuniz)

Date: 11/28/84

Background HNU Reading (Measured at Trailer): Oppm

Background EXP Reading (Measured at Trailer): O70

Background RAD Reading (Measured at Trailer): Omr/Ar

Work Area and Task: Air Rotory Drilling at Well D-S

Soil Boring / Rock Coring at SE-4

Ambient HNU Readings (Measured in Working Area): ARD: 0-0.2 ppm SB/RC: NR

Ambient EXP Readings (Measured in Working Area): ARD: 0-570 SB/RC: NR

Ambient RAD Readings (Measured in Working Area): ARD: 0 mc/nc SB/RC: 0 mc/nc SB/RC: 0 mc/nc

ARD required Level D SB/RC required Level C

Comments: HUU lost its change almost immediately. To be safe RCW with the auger rig (SB/Ri) decided to follow Level C. I told him this was a good idea.

On-Site Health and Safety Officer: John S. Thompson (Result)

Date: 11/29/84

Background HNU Reading (Measured at Trailer): NR

Background EXP Reading (Measured at Trailer): 0-3%

Background RAD Reading (Measured at Trailer): 0-04mr/hr

Work Area and Task: Air Rotory of 1110g of 51th D-8

Soil Boring/Rock College of 55-1

Ambient HNU Readings (Measured in Working Area): ARD: NR

Ambient EXP Readings (Measured in Working Area): ARD: 2-1470 SE/RC: NR

Ambient RAD Readings (Measured in Working Area): ARD: 0-.04 mr/hr SE/RC: 0-.04 mr/hr

Level of Protection Required:

ARD used Level C protection since Ron Weaver was using HNU on 58-1. Odor indicates something present in averburden. Exp indicates this also.

SB/RC started on Level C but low level HAU responses coused switch to Level D.

Comments:

On-Site Health and Safety Officer: Affrey 2. Thompson (REWAI)

Date: ///30/84

Background HNU Reading (Measured at Trailer): NR

Background EXP Reading (Measured at Trailer): NR

Background RAD Reading (Measured at Trailer): NR

Work Area and Task: Air Rotory Drilling on Well D-8

Soil Boring / Rock Coring on site SB-1

Ambient HNU Readings (Measured in Working Area): ARD: O-G.3 ppm

Ambient EXP Readings (Measured in Working Area): ARD: O-376

SE/RC: NR

Ambient RAD Readings (Measured in Working Area): ARD: NR

SE/RC: NR

Level of Protection Required:

ARD requires Level C protection. SB/RC requires Level D protection.

Comments: Water in D-8 has a sharp biting odor. Liciter towns also. HNU readings are for the most part under 5.0 ppm but we didn't like the odor, so decided to use level c. HNU readings inside casing are as high us 10ppm.
Radiation counter out of service (buttery).

Surveyors are an site and a check around the site showed Level D would be sufficient protection.

On-Site Health and Safety Office:

They D. Thompson (REWAT)

Date: 12/3/84

Background HNU Reading (Measured at Trailer): NR

Background EXP Reading (Measured at Trailer): NR

Background RAD Reading (Measured at Trailer): NR

Work Area and Task: Soil Boring/Rock Coring of SE-1

Ambient HNU Readings (Measured in Working Area): NR

Ambient EXP Readings (Measured in Working Area): NR

Ambient RAD Readings (Measured in Working Area): NR

Level of Protection Required:

Level D was used for rock coming and piezometer construction on SB-1.

Comments: No air rotory (deer hunting)
Very heavy rain and wind prevent use of HNU and EAP.

On-Site Health and Safety Officer: Jeffrey S. Thompson (Rinks)

Date: 12/4/84

Background HNU Reading (Measured at Trailer): 0-20pm Background EXP Reading (Measured at Trailer): 0% Background RAD Reading (Measured at Trailer): .33 mg/he Work Area and Task: Air Rotory Drilling of 5-4 Soil Boring Rock Coning of St.-1

Ambient HNU Readings (Measured in Working Area): ARD: 0-3.1 ppm SB/RC : NR Ambient EXP Readings (Measured in Working Area): ARD: 3-5% SE/RC: NR Ambient RAD Readings (Measured in Working Area): ARD: .01 mg/hc SB/R: NR

Level of Protection Required: ARD required Level C protection SB/RC required Level D protection

Comments: Although HNU readings on 5-4 were below sie film for the most port, ador in water and cutting necessitation level c. SB/RC was just cleaning up.

On-Site Health and Safety Officer: Affrey S. Thompson (REWLE)

Date: /2/5/84

Background HNU Reading (Measured at Trailer): O.5 ppm

Background EXP Reading (Measured at Trailer): 0%

Background RAD Reading (Measured at Trailer): . 03 mc/hc

Work Area and Task: Air Rotory work of 5-4 (finish well construction)
Air Rotory Drilling of Site D-7.

Ambient HNU Readings (Measured in Working Area): 0-0.7pm (0-7)

Ambient EXP Readings (Measured in Working Area): 0-2% (0-7)

Ambient RAD Readings (Measured in Working Area): 0-.03 mr/hr (D-7)

Level of Protection Required: Level D used to finish 5-4 construction

Level C used to drill D-7 (even though HNU is well be two to Drilling overburden so close to the actual fill name

me choose Level C.

Comments: Corl Boyer (KEWAI) and Dan Toter (NUDER) on site.

On-Site Health and Safety Officer: 12 & Thompson (den :=)

Date: /2/6/84

Background HNU Reading (Measured at Trailer): NR
Background EXP Reading (Measured at Trailer): NR
Background RAD Reading (Measured at Trailer): NR
Work Area and Task: Air Rotory work of D-7
water Levels (where site)

Ambient HNU Readings (Measured in Working Area): 0-0.4 ppm

Ambient EXP Readings (Measured in Working Area): NR

Ambient RAD Readings (Measured in Working Area): 0.3 ppm

Level of Protection Required: Level D protection was used for all work today.

Comments: Only 1' drilled today. Cosing broke downhole.
Retrieved as much of possible and hale bentanited shut.

On-Site Health and Safety Officer: Jeffrey 3. Thompson (REMAI)

Date: /2/7/85

Background HNU Reading (Measured at Trailer): 0.8 ppm

Background EXP Reading (Measured at Trailer): 0%

Background RAD Reading (Measured at Trailer): NR

Work Area and Task: Stort new D-7 with Air Rotory rig.

Ambient HNU Readings (Measured in Working Area): O-1.0ppm

Ambient EXP Readings (Measured in Working Area): O70

Ambient RAD Readings (Measured in Working Area): NR

Level of Protection Required: Air Rotory Required Level D protection.

Comments: move away from 1st ottempt on D.7 to try new attempt.

On-Site Health and Safety Officer: Ron waver (457)

Date: 12/10/85 to 12/14/85

Background HNU Reading (Measured at Trailer): NR

Background EXP Reading (Measured at Trailer): NR

Background RAD Reading (Measured at Trailer): NR

Work Area and Task: Work on well D-7 (no intrusive octivities)

Ambient HNU Readings (Measured in Working Area): NR Ambient EXP Readings (Measured in Working Area): NR Ambient RAD Readings (Measured in Working Area): NR Level of Protection Required: $Level D \omega cca$

comments: most of oby spent trying to pull 8" cosing.

On-Sitt health and Safety Officer: Ron Weover (Rewal)

Date: 12/17/84

Background HNU Reading (Measured at Trailer): 0-2.0 pp/ Background EXP Reading (Measured at Trailer): 0:3% Background RAD Reading (Measured at Trailer): NR Work Area and Task: Air Rotory chilling of Well D-7

Ambient HNU Readings (Measured in Working Area): 0.8-5.2 ppm

Ambient EXP Readings (Measured in Working Area): 2-5%

Ambient RAD Readings (Measured in Working Area): 0-.03 mr/br

Level of Protection Required: Level c protection was worn

for all drilling and development at D-7

Comments: weter wery formy. Only shown on surface.

On-Site Health and secrety Officer: Justine S. Thompson (RELAZ)

Date: /2//8/84

Background HNU Reading (Measured at Trailer): 0-1.0 ppm

Background EXP Reading (Measured at Trailer): 0%

Background RAD Reading (Measured at Trailer): NR

Work Area and Task: Air Rotory drilling of site 5-1 (near D.7)

Ambient HNU Readings (Measured in Working Area): 2.0-4.0 ppm

Ambient EXP Readings (Measured in Working Area): 2-5%

Ambient RAD Readings (Measured in Working Area): NR

Level of Protection Required: Level c was worn due to findings of D-7, and location near fill.

Ambient
Comments: HNU resolings pecked over 5.0 ppm periodically due to wind from Landfill.

On-Site Health and Safety Officer: Juffay S. Zhompson (Keuse)

Date: 12/19/85

Background HNU Reading (Measured at Trailer): NR

Background EXP Reading (Measured at Trailer): NR

Background RAD Reading (Measured at Trailer): NR

Work Area and Task: finish well construction of 5-1 and cleanup Air Rotory: of 5-1. Setup on site 0-9.

Ambient HNU Readings (Measured in Working Area): 0-3.0 ppm

Ambient EXP Readings (Measured in Working Area): 0-2%

Ambient RAD Readings (Measured in Working Area): 03 mg/ha

Level of Protection Required: Level D protection was worn for all work today.

Comments: Water levels taken across site (Level D)

On-Site Health and Safety Officer: Therefrom (Res. I)

Date: /2/20/84

Background HNU Reading (Measured at Trailer): 0-3 Pro

Background EXP Reading (Measured at Trailer): 0-/70

Background RAD Reading (Measured at Trailer): . 02 mg/hr

Work Area and Task: Air Rotory drilling at sick 0-9

Ambient HNU Readings (Measured in Working Area): 0-4 ppm

Ambient EXP Readings (Measured in Working Area): 0-10% (mostly 1-2%)

Ambient RAD Readings (Measured in Working Area): 0-03 mr/hr

Level of Protection Required: Level C protection was warn most of the time. Level D used periodically further owey from hole.

Comments: Occassionally higher HNU readings (5-7 ppm) occurred when wind would blow from landfill towards 0-9. Landfill odor noticed.

On-Site Health and Salecy Officer: Giffey . Thompson (Recents)

· Date: 12/21/84

Background HNU Reading (Measured at Trailer): 0-1.0ppm

Background EXP Reading (Measured at Trailer): 07.

Background RAD Reading (Measured at Trailer): .02mr/hr

Work Area and Task: Install cosing and grout 0-9

Ambient HNU Readings (Measured in Working Area): 0-2.0ppm

Ambient EXP Readings (Measured in Working Area): 0-1%

Ambient RAD Readings (Measured in Working Area): 0-.03 mr/hr

Level of Protection Required: Level & protection used for all work.

Comments: Snow flurries and windy. (Landfill doesn't smell).

Or.-Sit_ Health and Safety Officer: July S. Thompson (Reuse)

Date: 12/26/84

Background HNU Reading (Measured at Trailer): 0-1.0 ppm
Background EXP Reading (Measured at Trailer): 1-270
Background RAD Reading (Measured at Trailer): .02 mr/hr
Work Area and Task: Air Rotory drilling at 0-9

Ambient HNU Readings (Measured in Working Area): 0-2.0pm
Ambient EXP Readings (Measured in Working Area): 0%
Ambient RAD Readings (Measured in Working Area): NR
Level of Protection Required: Level 0 protection works.

Comments:

On-Site Health and Safety Officer: Ron Weaver (Rewor)

Date: 12/27/84

Background HNU Reading (Measured at Trailer): NR
Background EXP Reading (Measured at Trailer): NR
Background RAD Reading (Measured at Trailer): NR
Work Area and Task: Air Rotory Drilling of S-3.

Ambient HNU Readings (Measured in Working Area): O-7.0 ppm

Ambient EXP Readings (Measured in Working Area): 0%

Ambient RAD Readings (Measured in Working Area): NR

Level of Protection Required: Level c protection worn due to werburden drilling and proximity to landfill.

Comments: no odbr in SE comer.

On-Site Health and Safety Officer: Ron Witner (1200)

Date: /2/28/84

Background HNU Reading (Measured at Trailer): NR

Background EXP Reading (Measured at Trailer): NR

Background RAD Reading (Measured at Trailer): NR

Work Area and Task: finish well construction on S-3 and grout (seme D-S, D-7, D-8 + D-9

Ambient HNU Readings (Measured in Working Area): 0-3.0 pp.

Ambient EXP Readings (Measured in Working Area): 1-2%

Ambient RAD Readings (Measured in Working Area): NR

Level of Protection Required: Level D protection worn of all sites.

Comments:

On-Site Health and Safety Officer: Run Weaver (Revai)

Date: 1/2/85

Background HNU Reading (Measured at Trailer): 1.0 ppm
Background EXP Reading (Measured at Trailer): 2%
Background RAD Reading (Measured at Trailer): .02 mr/hr
Work Area and Task: Air Rotony Drilling on Site S-2.

Ambient HNU Readings (Measured in Working Area): 0-0.8 ppm

Ambient EXP Readings (Measured in Working Area): 07.

Ambient RAD Readings (Measured in Working Area): 0-.02 mr/hr

Level of Protection Required: Level D protection required for todays work.

Comments:

On-Site Health and Safety Officer: July & Franciscon (Faul-)

Date: 1/3/85

Background HNU Reading (Measured at Trailer): 0-1.0pm

Background EXP Reading (Measured at Trailer): 07

Background RAD Reading (Measured at Trailer): NR

Work Area and Task: work on well 5-2 (well construction)

Ambient HNU Readings (Measured in Working Area): Oppor

Ambient EXP Readings (Measured in Working Area): 0%

Ambient RAD Readings (Measured in Working Area): NR

Level of Protection Required: Level D protection required.

Comments: Much of day spent trying to pull temporary 10" steel on 5-2. Cosing is stuck. Broke coving puller.

On-Site Health and Safety Officer: felice S. Thompson (KEWAI)

Date: 1/4/85

Background HNU Reading (Measured at Trailer): NR

Background EXP Reading (Measured at Trailer): NR

Background RAD Reading (Measured at Trailer): NR

Work Area and Task: trying to pull cosing on 5-2

Ambient HNU Readings (Measured in Working Area): NR

Ambient EXP Readings (Measured in Working Area): NR

Ambient RAD Readings (Measured in Working Area): NR

Level of Protection Required: Level D protection worn bosed on previous doys work.

Comments: Cosing puller broke ogsin.

On-Site Health and Safety Office: Aufrey S. Thompson (Recent)

Date: 1/7/85

Background HNU Reading (Measured at Trailer): 0-1.0ppm

Background EXP Reading (Measured at Trailer): 1-276

Background RAD Reading (Measured at Trailer): .02 - .03 mr/hr

Work Area and Task: Set up on 5/te S-6, grout 5-4 x 0-8

Ambient HNU Readings (Measured in Working Area): Oppm

Ambient EXP Readings (Measured in Working Area): 0-17.

Ambient RAD Readings (Measured in Working Area): 0-.02 mr/hr

Level of Protection Required: Level D protection worn for all work today.

Comments:

On-Site Health and Safety Officer: July 8. Thompson. (Rewall)

Date: //8/85

Background HNU Reading (Measured at Trailer): NR

Background EXP Reading (Measured at Trailer): NR

Background RAD Reading (Measured at Trailer): NR

Work Area and Task: Air Robory Drilling of Site 5-6

woter Levels

Ambient HNU Readings (Measured in Working Area): 0-1.2 ppm

Ambient EXP Readings (Measured in Working Area): 0%

Ambient RAD Readings (Measured in Working Area): 0-.02 m/hr

Level of Protection Required: Level D protection worn based on previous work at well 0-1.

(Level C available of needed).

Comments:

On-Site Health and Safety Officer: Affrey S. Thompson (Raux)

Date: 1/9/85

Background HNU Reading (Measured at Trailer): NR

Background EXP Reading (Measured at Trailer): NR

Background RAD Reading (Measured at Trailer): NR

Work Area and Task: Drilling and well construction of S-6.

Ambient HNU Readings (Measured in Working Area): 0-0.8 ppm

Ambient EXP Readings (Measured in Working Area): 070

Ambient RAD Readings (Measured in Working Area): 0-02 mr/hr

Level of Protection Required: Level 0 protection worn for oil work.

Comments: cold temps. ore causing freezing problems with the rig.

On-Site Health and Safety Officer:

Gelley D. Thompson (RENDE)

Date: //10/85

Background HNU Reading (Measured at Trailer): Oppm

Background EXP Reading (Measured at Trailer): 0%

Background RAD Reading (Measured at Trailer): 0% mr/hr

Work Area and Task: Air Rotory Drilling on Well D-3

Ambient HNU Readings (Measured in Working Area): 0-0.5ppm

Ambient EXP Readings (Measured in Working Area): 0%

Ambient RAD Readings (Measured in Working Area): 0-.03 mr/hr

Level of Protection Required: Level D protection required.

Comments:

On-Site Heal and Safety Officer: Affan 2. Thompson (REWAT)

Date: 1/11/85

Background HNU Reading (Measured at Trailer): 0-0.25ppm

Background EXP Reading (Measured at Trailer): 0-1%

Background RAD Reading (Measured at Trailer): O - · OZ mr/hr

Work Area and Task: Air Rotory Drilling on Well 0-3

Ambient HNU Readings (Measured in Working Area): 0 - 0.4 ppm

Ambient EXP Readings (Measured in Working Area): 07

Ambient RAD Readings (Measured in Working Area): 0-.04 mr/h.

Level of Protection Required: Level 0 protection work.

Comments:

On-Site Health and Safety Officer: Jeffing S. Thompson (Kanaz)

Date: 1/14/85

Background HNU Reading (Measured at Trailer): 0-.5ppm

Background EXP Reading (Measured at Trailer): 0-17.

Background RAD Reading (Measured at Trailer): .02 mr/hr

Work Area and Task: Air Rotory Drilling of Site D-4

Ambient HNU Readings (Measured in Working Area): 0.6-2.2pm

Ambient EXP Readings (Measured in Working Area): 0-170

Ambient RAD Readings (Measured in Working Area): NR

Level of Protection Required: Level 0 protection worn.

(Storted on Level C for \$100)

Comments: Rig broke down.

On-Site Health and Safety Officer: Jelicy S. Thinkin (REWAE)

Date: //15/85

Background HNU Reading (Measured at Trailer): NR

Background EXP Reading (Measured at Trailer): NR

Background RAD Reading (Measured at Trailer): NR

Work Area and Task: Fixing rig one installing casing.

Ambient HNU Readings (Measured in Working Area): NR

Ambient EXP Readings (Measured in Working Area): NR

Ambient RAD Readings (Measured in Working Area): NR

Level of Protection Required: Level & protection warn base on previous days work at this site.

Comments: Very cold temps are affecting HNU + EXP. (Batteries losing charge)

On-Site Health and Safety Officer: Affrey & Thompson (And)

Date: 1/16/85

Background HNU Reading (Measured at Trailer): Oppm

Background EXP Reading (Measured at Trailer): 0%

Background RAD Reading (Measured at Trailer): 0-.02 mr/hr

Work Area and Task: Work on Well D-4

Ambient HNU Readings (Measured in Working Area): 0-.2ppm

Ambient EXP Readings (Measured in Working Area): 07

Ambient RAD Readings (Measured in Working Area): .02mr/hr

Level of Protection Required: Level & Protection is worn.

Comments: Very cold again. Instruments won't hold change long.

Un-Site Health and Safety Officer: Affrey & Thompson (REWR-)

Date: 1/17/85

Background HNU Reading (Measured at Trailer): NR
Background EXP Reading (Measured at Trailer): NR
Background RAD Reading (Measured at Trailer): NR
Work Area and Task: no chilling the to snow.
When Levels token.

Ambient HNU Readings (Measured in Working Area): NR

Ambient EXP Readings (Measured in Working Area): NR

Ambient RAD Readings (Measured in Working Area): NR

Level of Protection Required: Level D worn for woter levels

based on prior Site experience.

Comments: .

On-Site Health and Safety Officer: 4

y S. Thompson (River)

Date: 1/18/85

Background HNU Reading (Measured at Trailer): Oppose
Background EXP Reading (Measured at Trailer): 0%
Background RAD Reading (Measured at Trailer): NR
Work Area and Task: Air Rotory Drilling on Well 0-4.

Ambient HNU Readings (Measured in Working Area): 0-0.4ppm

Ambient EXP Readings (Measured in Working Area): 075

Ambient RAD Readings (Measured in Working Area): 0-02 mm/hr

Level of Protection Required: Level 0 protection worn.

Comments: +4" Snow (very cold).

On-Site Health and Safety Officer: Thompson (REWAL)

Date: 1/2//85

Background HNU Reading (Measured at Trailer): NR
Background EXP Reading (Measured at Trailer): NR
Background RAD Reading (Measured at Trailer): NR
Work Area and Task: 10008

Ambient HNU Readings (Measured in Working Area): NR
Ambient EXP Readings (Measured in Working Area): NR
Ambient RAD Readings (Measured in Working Area): NR
Level of Protection Required: NOR

Comments: No work today due to extreme cold. Health wornings out about prolonged exposure so no work today.

On-Site Health and Safety Officer: Citing & Thompson (REWAZ)

Date: 1/22/85

Background HNU Reading (Measured at Trailer): 1-0 ppm

Background EXP Reading (Measured at Trailer): 0%

Background RAD Reading (Measured at Trailer): 03 mr/hr

Work Area and Task: Air Rotory Drilling on Well 5-5.

Ambient HNU Readings (Measured in Working Area): 0.2-0.8 ppm

Ambient EXP Readings (Measured in Working Area): 0-176

Ambient RAD Readings (Measured in Working Area): 0-03 mc/fc

Level of Protection Required: Level D protection worn

Comments: New Wehler (Rewall) on site.

On-Site Health and Safety Officer: Julius 2. Thompson (REURE)

Date: 1/23/85

Background HNU Reading (Measured at Trailer): 0-1ppm

Background EXP Reading (Measured at Trailer): 0-170

Background RAD Reading (Measured at Trailer): 0-.02mr/hr

Work Area and Task: Develop Well 5-5 and begin drilling Well D-6.

Ambient HNU Readings (Measured in Working Area): D6:0-2.Cfpm

Ambient EXP Readings (Measured in Working Area): S5:0%
D6:15-1007

Ambient RAD Readings (Measured in Working Area): S5:NR
D6:.02

Level of Protection Required: Level D protection on S5.

Level c protection on D-6.
(Drilled to Zy's install 10" cosing).

Comments: Explosimeter readings are varying greatly on D-6.
Ambient around working area is 0-20%. Peaks of 100% occur inside cosing. Hole left to oir a bit then proceed coutiously. Levels diopped some offer casing installation.

On-Site Health and Safety Officer: Lifery S. Thompson

Date: 1/24/85

Background HNU Reading (Measured at Trailer): 10pm

Background EXP Reading (Measured at Trailer): 0%

Background RAD Reading (Measured at Trailer): NR

Work Area and Task: Air Rotory Drilling of site D-6.

Ambient HNU Readings (Measured in Working Area): 0-4.2 ppm

Ambient EXP Readings (Measured in Working Area): 0-10%

Ambient RAD Readings (Measured in Working Area): NR

Level of Protection Required: Level C was worn at all times since hole was being drilled through certain of londfill.

Comments: Exp. levels one much lower than yesterday but some high peaks still occur. Carl Boyer (Rewas) on site.

On-Site Health and Safet; Officer: gueleu S. Thompson (Results)

Date: 1/25/85

Background HNU Reading (Measured at Trailer): NR
Background EXP Reading (Measured at Trailer): NR
Background RAD Reading (Measured at Trailer): NR
Work Area and Task: Air Rotory Drilling of Site D.E.

Ambient HNU Readings (Measured in Working Area): 0-4.0 ppm

Ambient EXP Readings (Measured in Working Area): 1072

Ambient RAD Readings (Measured in Working Area): NR

Level of Protection Required: Level of Protection was worn of all times as a precoution.

Comments: Most of day spent installing 6 and 8" cosing.
Constant Exp. monitoring corried out during cosing installation.

On-Site Health and Safety Officer: Sifficy 2. The gran (Research)

Date: 1/28/95

Background HNU Reading (Measured at Trailer): 1-0 ppm

Background EXP Reading (Measured at Trailer): 0%

Background RAD Reading (Measured at Trailer): NR

Work Area and Task: Air recory drilling of Size D-6.

Ambient HNU Readings (Measured in Working Area): 0-3.2 pp.

Ambient EXP Readings (Measured in Working Area): 0-12 %

Ambient RAD Readings (Measured in Working Area): .02 mr/hr

Level of Protection Required: Level C protection was work of of old times while working and this hole.

Comments:

On-Site Health and Safety Officer: Alley S. Thompson (3-11)

Date: 1/29/85

Background HNU Reading (Measured at Trailer): 1.2 ppm

Background EXP Reading (Measured at Trailer): 0%

Background RAD Reading (Measured at Trailer): .02 mc/hr

Work Area and Task: grout well 0-C and begin drilling well 0-2. Water levels at token.

Ambient HNU Readings (Measured in Working Area): 0.2 - 0.6 ppm

Ambient EXP Readings (Measured in Working Area): 0%

Ambient RAD Readings (Measured in Working Area): .02-.03 mr/m

Level of Protection Required: Level D protection worn. (Level convolute if recover but since but since but since but wearing it).

Level D for worker first.

Comments: Slight order to woter in D-2.

On-Site Health and Safety Officer: Jeffey 2. Thempon (Reali)

Date: //30/35

Background HNU Reading (Measured at Trailer): Open

Background EXP Reading (Measured at Trailer): 0%

Background RAD Reading (Measured at Trailer): 02mn/hr

Work Area and Task: Air rotory work at site D-Z.

Ambient HNU Readings (Measured in Working Area): 0-0.4 ppm
Ambient EXP Readings (Measured in Working Area): 07
Ambient RAD Readings (Measured in Working Area): 02 mr/hr
Level of Protection Required: Level D protection worn.

Comments: Water has a slight odor.

On-5:+= nealth and Safety Officer: Alley S. Thompson (ROVA-)

Date: 1/31/85

Background HNU Reading (Measured at Trailer): 0-1ppm

Background EXP Reading (Measured at Trailer): 0-170

Background RAD Reading (Measured at Trailer): 03 mr/nr

Work Area and Task: Air rotory drilling at Well b-z

Ambient HNU Readings (Measured in Working Area): 0-1.4 pm

Ambient EXP Readings (Measured in Working Area): 07.

Ambient RAD Readings (Measured in Working Area): .02-.03 mm/hm

Level of Protection Required: Level D protection worm.

Comments:

On-Site Health and Safety Officer: Achie & Thompson (Resign)

Date: 2/19/85

Background HNU Reading (Measured at Trailer): \bigwedge ?

Background EXP Reading (Measured at Trailer): N_R

Background RAD Reading (Measured at Trailer): NR

Work Area and Task: Work on Well 5-2 (try to pull casing).

Surveyors on site.

Ambient HNU Readings (Measured in Working Area): 0-1.0 ppn)

Ambient EXP Readings (Measured in Working Area): 07.

Ambient RAD Readings (Measured in Working Area): NR

Level of Protection Required: Level D protection worn.

Surveyors on Evel D.

Comments: Cosing not coming out.

On-Site Health and Safety Officer: Aller S. T. confron (1964)

r.e. wright associates, inc.

Date: 2/20/85

Background HNU Reading (Measured at Trailer): NR

Background EXP Reading (Measured at Trailer): NR

Background RAD Reading (Measured at Trailer): NR

Work Area and Task: Work on Well 5-2 (try to Pull cosmo)

Surveyor: on Site.

Ambient HNU Readings (Measured in Working Area): Oppm
Ambient EXP Readings (Measured in Working Area): 0%
Ambient RAD Readings (Measured in Working Area): NR
Level of Protection Required: Level D protection worn.
Surveyors on level D.

Comments: Cosing puller broke, cosing stayed in hole.

On-Site Health and Safety Officer: filling S. Hiompson (Force)

Date: 8/27/85

Background HNU Reading (Measured at Trailer): 0.2 ppm

Background EXP Reading (Measured at Trailer): 1% (OXYCEN METER 20.4%)

Background RAD Reading (Measured at Trailer): NR

Work Area and Task: Monitoring Well Sompling
Test Pit Investigations

Ambient HNU Readings (Measured in Working Area):

266, 96/2017 266, 96/2017

Test Pits

Ambient EXP Readings (Measured in Working Area):

Ambient RAD Readings (Measured in Working Area): NR

Level of Protection Required: Level, a protection was work for

Monitoring Wells EXP OXYGEN Inside well casings are all ch. 0-5 0- 0.25 1% 20.5% D-1 0-0.25 Level D worn for simpling. 0-170 20.2% D-2 0-0.75 0% 20.57 D-4 0-0.25 0-17, 20.47 2-6 0-0.25 0-1% 20.4% 5-5 Comments: LMS is sampling monitoring wells. NIDER is on site to observe.

On-Site Health and Safety Officer: 4 Law & Thompson (REWALL)

Date: 8/25/35

Background HNU Reading (Measured at Trailer): 1.0 pm

Background EXP Reading (Measured at Trailer): /%

Background RAD Reading (Measured at Trailer): 20-6%

Work Area and Task:

Ambient HNU Readings (Measured in Working Area): $\frac{\omega_e // D - Z}{D - // D P D D}$ Ambient EXP Readings (Measured in Working Area): $\frac{D V_0}{D \times V_0} = \frac{D V_0}{D \times$

Comments: Also rechected wells D-1, D-4, 5-6, 5-5, and D-5 and all were safe for Level D.

LMS on Site.

(Problems accurring to sampling not finished).

On-Site Health and Safety Officer: Affice 2 Thompson (Result)

To: File 85100

From: Kent V. Littlefield KVV

Date: September 18, 1985

Re: Combe South Air Sampling

Arrived at the site at around ll:00 a.m. Met Howard Leeman and Matt Reilly of U.S. Testing, who are running the air sampling study. I traveled with them to the sampling locations and they are designated as follows for today: A-8 is located approximately 200 feet south of DW-6 on top of the landfill, A-10 is approximately 150 feet west of DW-6 on top of the landfill, and A-12 and A-12 duplicate are located at the north portion of the landfill on the mass approximately 100 to 200 feet northeast of the old shop. D-4 is the designated upwind sampling location located out on the pasture to the west of the site. UD-2 is the downwind sampling location located at the curve in the entrance road on the east section of the site where the two access roads split.

Background HNU readings were 2 ppm; however, some readings may have been caused by the high gasoline vapor content in the truck at about 5-10 ppm. Explosive conditions were not noted nor any HNU readings above background at any of the sampling points. Following initial recon of these sites, I had the HNU malfunction and could not be used for the remainder of the field investigation. U.S. Testing left the site at 1430 hours for lunch and returned at 1600 hours to continue operation of the equipment.

The testing equipment includes a high volume particulate sampler which consists of an eight-inch by eight-inch piece of filter paper with a high-volume blower drawing air through it. The organic vapor detectors are battery-powered pumps and are housed within a sheet metal enclosure approximately eight inches off the ground.

I noted that at some locations, the gasoline powered generators, which provide the power for the high volume air sampling, were upwind from the sample location. This was particularly true at sampling point A-8 and I requested the generator be relocated to lateral wind direction. The same was true for A-12, although not as direct a line. However, we relocated that generator as well. The sampling was completed around 1730 hours and we left the site at that time.

To: File 85100 - Combe Fill South Air Sampling

From: Kent V. Littlefield KNL

Date: September 19, 1985

Re: Combe South Air Sampling

Arrived at the site at 8:15 a.m. Downwind sampler was not activated as yet. When I arrived at the trailer, only one generator was on. The personnel from U. S. Testing were on site at approximately 8:00 a.m. Between 8:00 a.m. and 9:00 a.m., they began the third and last day of air sampling.

To: Ruth M. Maikish

Project Manager-LMS

File 85100-Combe Fill South Landfill HSO Monitoring

File 8455-Combe Fill South Landfill-Field Notes/Corre-

spondence

Carl G. Boyer REWAI Project Manager 3 From:

October 9, 1985 Date:

Leachate Seep Reconnaissance Re:

1100 - Arrived Combe South Landfill, the gate is locked all appears secure, there is a full 55-gallon drum of potable water remaining from the sampling events last month. water has gone somewhat rusty. Someone has placed a concrete block inside the gate at the center. It does not appear to have any purpose. The trailer is empty with the exception of bees, the soil samples from the soil boring rock coring, the submersible pumps pulled from the existing deep wells on site, and one or two miscellaneous small items.

I have suited up in Level D protection including Tyvek rubber boots and inner gloves. I have mobilized a photovac TIP photoionization detector. This detector functions very much the same way as an HNU photoionization detector, however, an HNU was not available. Background readings at the trailer using the TIP photoionization detector (PID) at 0.4 ppm. Using a nuetronics exotox gas montior, explosivity is at 2 percent, oxygen at 5 percent, background radiation at .02 millirems per hour (mR). Temperature is approximately 70 to 72 degrees, the sun is shining, the wind is fairly steady at about 5 to 10 mph to the northeast (using the New Jersey power line as a north/south orientation.) There are no distinct landfill odors at the site so far.

1125 - Having suited up, I am now at Leachate Seep #2 to the immediate east of Well D-8. The site is marked by a LMS stake with green and orange paint. The seep is wet and flowing. There is standing water in a circular area around the stake roughly measuring five feet in radius. The depth of the fluid is about one to two inches overall. There is a distinct sheen at the surface in many areas.

> Aside from the sheen the water appears to be generally clear with a red hue. There is a cottony like algal or fungus growth on the submerged rock surfaces. There is also a small white flag which I have just noticed in the seep area. It is labelled ERT-08.

There is a steady trickling through this area. I would guess that the rate of fluid influx to be about 0.25 gpm. There is no change in background readings of the PID, explosimeter, or radiation detector in this area. There are no anomalous readings at the seep surface with the PID either.

Leachate Site L-3

I am at the first ditch crossing the access road along the east face of the landfill. There is flow across this Site L-3 is to the immediate southwest of the ditch. There is standing water immediately downgradient ditch. from the stake, which I assume marks Site L-3. The stake is very weathered and has no legible markings on it. however, there is bubbling in the puddle at the base of As I recall, this was a very effervescent the stake. This entire area, however, was as dry as site last July. There is standing water in this area a bone last month. about one-quarter to one-half inch in depth overall. bubbling at the seep site is at a rate of perhaps one one-half inch bubble per second, nothing dramatic, but nonetheless present. Areas adjacent to the seep and present standing water appear to have been recently Therefore, I would assume that the saturation saturated. now evident is receding at an unknown rate. There are deer tracks all around the seep, this is apparently a watering hole.

HNU readings maintained at about 0.1 to 0.4 (background). No change in explosivity or radiation, however, I do pick up an occassional whiff of landfill odor, nothing severe.

The sheen at the surface prevalent at Leachate Site \$2 is not present here. Also, this seep area has a green hue as opposed to the red hue noticed at Site L-2. There are no positive readings on the PID at the bubbling point at Site L-3. The bubbling is taking place at a lip in the soil surface, I cannot make direct access with the explosimeter to measure methane content since I do not have a probe extension similar to the PID.

As I think I said before, I cannot ascertain the rate of luid influx to Site L-3. The ditch across the access road to the north of Site L-3 is flowing at a very slow rate, perhaps slower than 0.25 gpm, probably close to 0.1 gpm. There is a small amount of ponding here. The hue at this site is also green.

- 1150 The second ditch crossing the access road, located to the south of L-3 is also wet. There is no measurable flow rate, however, it is nevertheless wet in contrast to the dryness observed last month. Signs of adjacent dampness indicate that the "flow" is in recession.
- 1200 Near Well D-9, as usual, the landfill odor is very distinct in this area PID is 0.4 ppm in ambient conditions. Measurements in the crevice at the perimeter of the landfill in this area were up to 2 ppm using the PID.

Leachate Site L-4

There was evidence of distinct leachate flow at this site. There is a reddish-black oozy-like stain coming from the toe of the site in this area, proceeding to the southwest and following the haul road to the west for perhaps 75 to 100 feet until it comingles with leachate coming from Seep \$5. There is no measurable flow or visible evident flow in this seep or leachate Seep \$5. However, there was undoubtedly a fair amount of movement recently. Last month this area was dry. It is possible that leachate collection for chemical analyses could be performed here by digging a hole and allowing leachate to collect. However, I doubt if much could be collected in a days' time.

Background PID measurements is 0.4 ppm, Nominal increases at the leachate seep surface to perhaps .1 ppm above background at the most.

This seem is located along the south face of the landfill and is marked at the highest point of seep emergence by a stake labelled S #4, painted green and orange.

Leachate Seep Site L-5

This seep is also located along the south face of the landfill approximately 100 feet west of Site L-4. This is also marked by a stake with green and orange paint labelled L-5. The conditions here are similar to those witnessed at Leachate Seep Site L-4. There is a reddish-black discharge approximately six feet above the toe of the slope. There is no measurable or visible flow, however, although the seep discharge is obviously wet. Background PID measurement have increased to about 1.3 ppm in the area. I have no ready explanation for this, it does not seem to be the leachate. There is a white flag at the toe of the slope in the path of the

leachate, marked ERT1. Noteworthy along the slope to the west of L-5 is that there are several former seep discharge areas evidenced by red staining on the slope. These areas are dry now in contrast to the recently active areas described above.

Leachate Seep Site L-6

1220 - This site is located to the north of the southwest corner of the landfill along the western face. It is marked with a stake painted green and orange and labelled L-6. Recent leachate flow in this area is evident. The conditions are similar to those found at Sites L-4 and L-5. There is, however, a slight trickling flow approximately 10 feet immediately downgradient from the stake. I would estimate the flow rate at perhaps two pints per hour. There is a small puddle of standing leachate at the base of the stake. This puddle measures approximately one foot in diameter at a depth of perhaps two inches. There is a film or sheen at the surface of the leachate. It is difficult to estimate flow, however, I would estimate that there is a flow under the film similar to that described above.

There are four small flags in the leachate flow path downgradient from the stake about 15 feet. Three are yellow and are labelled C-6-11, C-6-7, and C-6-3 the fourth flag is labelled ERT-5.

Former seep areas adjacent to this seep are also evidenced by red staining on the slope. These areas do not appear to be active, at least within the recent past.

There are one or two additional seep outlets downgradient from Site \$6\$ that are presently wet. However, no measurable flow is evident. At the toe of the slope downgradient from Site L-6 within the grassy area, there are small segregated pools of standing leachate, probably intermixed with runoff. Due to the high grass, it is difficult to quantify this area, however, I would estimate that the collection area is oval-shaped long access perhaps 75 feet parallel to the toe of the slope, short access perhaps 20 feet, overall fluid depth average linch. There are three additional yellow flags on the slope further downgradient from Site L-6 labelled C-6-10, C-6-6, and C-6-2. There is at least two additional flags further downgradient along the leachate flow path.

As noted in other areas, the moisture staining adjusent to the active seep areas indicate recession.

Leachate Seep Site L-7

1250 - I tried to get to Site L-7 which is located on the west face of the landfill. This area is very heavily vegetated. There is an active seep located anomalously high on the landfill slope, I would estimate approximately 25 feet vertically from the top (perhaps 5 feet less). It is wet but there is no visible flow coming from it. There are residual leachate stains further upslope from this one these are; however, dry. I am trying to work my way downslope in the general direction of L-7. There are several leachate seep areas along this slope, which are located to the southeast of the "dead tree" at the toe of the west face of the landfill. These areas can at Lest be described as soggy with no visible flow. They are wet.

About midway down the slope and approximately 150 feet southeast of the fallen tree at the toe of the slope, there is a bubbling seep area that is actively omitting gas. Fluid flow is not measurable, at the most a trickle, if a collection could be excavated. The sound of bubbling and gas emissions in this area could be easily discernible above other noises. This site is about halfway down the slope.

Continuing further, I am looking for a marker indicating Site L-7. There are several very active gas vents in this area.

I see the stake marking Site L-7. It is just downgradient and approximately 100 feet south and west of the vents described above. The side of the slope leading to Site L-7 is muddy. The characteristic leachate red hue is absent here. If anything, there is a slight green hue.

At site L-7, there is a small puddle just downslope from the stake. There are occassional air bubbles coming out of the puddle which measures perhaps two feet in length by one foot in width with standing fluid approximately two to three inches in depth. There is no visible flow from the puddle, but there is a flow path continuing down the side of the slope to the toe of the slope. There are small puddle collection areas along this slope path. The seep here does not have the black-red coloration of seeps further to the south along this face and along the south

face. There is some sheen at the surface, but the overall hue, if any, is green.

The toe of the slope is located approximately 15 feet downgradient from L-7. The area can be describe generally as soggy with small collection areas for leachate and surface runoff. There are some reed patches.

PID readings at Site L-7 are at .6 ppm (surrounding conditions). No above background readings obtained at the fluid surface at L-7.

Going back up the slope to the top of the landfill at the air vents noted before, PID readings at the vents measured at 1.7 ppm. Ambient conditions measured at 0.6 ppm. Explosivity exceeds 50 percent after three seconds of exposure at the vent surface. In summary, the vent seems to be essentially all methane with perhaps one ppm other gases.

There is a small crevice area at the top of the landfill immediately upgradient from Site L-7. This crevice measures approximately 15 feet in length. There does not appear to be a great amount of positive air flow from the crevice which parallels the west face of the landfill. There are no positive PID readings inside the crevice nor are there positive explosimeter readings inside the crevice.

1330 - Moving along the top of the landfill in the vicinity of Well D-6, the landfill odor in this area is nauseating as usual. PID reading at 1 ppm. I am going to circle the northwest corner of the fill to access Site L-8.

At the northwest corner of the landfill, the run at the toe of the slope in this area is dry and shows only small signs of recent moisture. This is particularly in the small sediment fan at the outwash area of this gully. I believe Site L-8 is in this area somewhere, if my recollection serves me correctly. A green and yellow-orange stake is to the immediate south of a stand of dead trees in an area that used to contain ponded water. This water is thickly vegetated with tall grass and at best can be described as slightly moist to dry. The stake is marked Seep \$12. This is not leachate seep Site \$8. I assume L-8 must be to the south of my position.

About 50 feet south of the stake marking L-12, there is a small pond measuring about 15 feet by 6 feet, water in the pond is standing at a depth of about 3 to 4 inches. There are two used tires in the pond. To the immediate south of this ponded area there are some seep flow paths. The ground can be described as muddy, but a distinct flow is not evident.

PID remains at about .6 ppm background. There are several seeps in this area similar in flow characteristics to that of Site L-7 with small puddles, but no visible flow. I assume Site L-8 is in this vicinity somewhere, however, I do not see any stakes. I am now about 200 to 300 feet north of where I was when looking for Site L-7. If L-8 is in this area, I believe that is safe to assume that flow characteristics are similar to the rest of the seeps on this face of the landfill.

1355 - Having progressed further south along the west face of the slope, I have found Leachate Site L-8. There is a visible trickle coming from this seep. The seep can be described as having a dark green to blacking hue with a definite sheen at the surface. There are frogs living in this small puddle at the seep outlet. I would estimate the flow from this seep to be approximately 0.1 gallons per minute. The stake is marked with green paint and labelled L-8. The flow appears to continue downslope to the toe of the slope where it joins with other seep flows and collective surface runoff.

This site is located immediately upgradient from a dead tree stand marked further by some lying dead tree stumps at the toe of the slope. There appears to be a pond immediately behind the tree line. PID readings remain at background with no distinct increases at the leachate surface.

Leachate Seep L-1

1410 - I'm in the vicinity of Site L-1, in the reeds area on the west face of the "old fill". I have found a stake with green paint on the top, however, there is no writing on the stake. There is a puddle of leachate near the base of the stake measuring perhaps 1.5 feet in diameter by three to four inches in depth. There are bubbles coming from the base of the puddle. The bubbling is sporatic and not very violent. In volume, I would estimate approximately one bubble measuring one inch in diameter per five seconds.

There is a very small trickle flowing down slope from the puddle along the leachate flow path. The trickle is to small to visually quantify.

The drainage swale downgradient from Site L-l is for all practical purposes dry. There is no flow in this swale. The sediment is moist to saturated, but there appears to be no channelling of runoff or leachate. Further north toward the New Jersey Power Company tower, downgradient from Site L-l, there is some pooling of leachate and/or runoff within the reeds in that area. The depth of the standing water in this area is probably no more than one inch.

- 1500 Have called Karen Wright at LMS and relayed the above information. Adequate decontamination and equipment packed up, I am leaving the site.
- 1515 Site secure.

To: File 85100

From: Kent V. Littlefield KVV

Date: September 18, 1985

Re: Combe South Air Sampling

Arrived at the site at around ll:00 a.m. Met Howard Leeman and Matt Reilly of U.S. Testing, who are running the air sampling study. I traveled with them to the sampling locations and they are designated as follows for today: A-8 is located approximately 200 feet south of DW-6 on top of the landfill, A-10 is approximately 150 feet west of DW-6 on top of the landfill, and A-12 and A-12 duplicate are located at the north portion of the landfill on the mass approximately 100 to 200 feet northeast of the old shop. D-4 is the designated pwind sampling location located out on the pasture to the west of the site. UD-2 is the downwind sampling location located at the curve in the entrance road on the east section of the site where the two access roads split.

Background HNU readings were 2 ppm; however, some readings may have been caused by the high gasoline vapor content in the truck at about 5-10 ppm. Explosive conditions were not noted nor any HNU readings above background at any of the sampling points. Following initial recon of these sites, I had the HNU malfunction and could not be used for the remainder of the field investigation. U.S. Testing left the site at 1430 hours for lunch and returned at 1600 hours to continue operation of the equipment.

The testing equipment includes a high volume particulate sampler which consists of an eight-inch by eight-inch piece of filter paper with a high-volume blower drawing air through it. The organic vapor detectors are battery-powered pumps and are housed within a sheet metal enclosure approximately eight inches off the ground.

I noted that at some locations, the gasoline powered generators, which provide the power for the high volume air sampling, were upwind from the sample location. This was particularly true at sampling point A-8 and I requested the generator be relocated to lateral wind direction. The same was true for A-12, although not as direct a line. However, we relocated that generator as well. The sampling was completed around 1730 hc s and we left the site at that time.

To: File 85100 - Combe Fill South Air Sampling

From: Kent V. Littlefield KUL

Date: September 19, 1985

Re: Combe South Air Sampling

Arrived at the site at 8:15 a.m. Downwind sampler was not activated as yet. When I arrived at the trailer, only one generator was on. The personnel from U. S. Testing were on site at approximately 8:00 a.m. Between 8:00 a.m. and 9:00 a.m., they began the third and last day of air sampling.

To: Ruth M. Maikish

Project Manager-LMS

File 85100-Combe Fill South Landfill HSO Monitoring

File 8455-Combe Fill South Landfill-Field Notes/Corre-

spondence

From: Carl G. Boyer REWAI Project Manager

3

Date: October 9, 1985

Re: Leachate Seep Reconnaissance

appears secure, there is a full 55-gallon drum of potable water remaining from the sampling events last month. The water has gone somewhat rusty. Someone has placed a concrete block inside the gate at the center. It does not appear to have any purpose. The trailer is empty with the exception of bees, the soil samples from the soil boring rock coring, the submersible pumps pulled from the existing deep wells on site, and one or two miscellaneous small items.

I have suited up in Level D protection including Tyvek rubber boots and inner gloves. I have mobilized a photovac TIP photoionization detector. This detector functions very much the same way as an HNU photoionization detector, however, an HNU was not available. Background readings at the trailer using the TIP photoionization detector (PID) at 0.4 ppm. Using a nuetronics exotox gas montior, explosivity is at 2 percent, oxygen at 5 percent, background radiation at .02 millirems per hour (mR). Temperature is approximately 70 to 72 degrees, the sun is shining, the wind is fairly steady at about 5 to 10 mph to the northeast (using the New Jersey power line as a north/south orientation.) There are no distinct landfill odors at the site so far.

1125 - Having suited up, I am now at Leachate Seep \$2 to the immediate east of Well D-8. The site is marked by a LMS stake with green and orange paint. The seep is wet and flowing. There is standing water in a circular area around the stake roughly measuring five feet in radius. The depth of the fluid is about one to two inches overall. There is a distinct sheen at the surface in many areas.

Aside from the sheen the water appears to be generally clear with a red hue. There is a cottony like algal or fungus growth on the submerged rock surfaces. There is also a small white flag which I have just noticed in the seep area. It is labelled ERT-08.

The control exact the life into

There is a steady trickling through this area. I would guess that the rate of fluid influx to be about 0.25 gpm. There is no change in background readings of the PID, explosimeter, or radiation detector in this area. There are no anomalous readings at the seep surface with the PID either.

Leachate Site L-3

I am at the first ditch crossing the access road along the east face of the landfill. There is flow across this Site L-3 is to the immediate southwest of the ditch. There is standing water immediately downgradient ditch. from the stake, which I assume marks Site L-3. The stake is very weathered and has no legible markings on it. However, there is bubbling in the puddle at the base of the stake. As I recall, this was a very effervescent site last July. This entire area, however, was as dry as a bone last month. There is standing water in this area about one-quarter to one-half inch in depth overall. bubbling at the seep site is at a rate of perhaps one one-half inch bubble per second, nothing dramatic, but nonetheless present. Areas adjacent to the seep and present standing water appear to have been recently saturated. Therefore, I would assume that the saturation now evident is receding at an unknown rate. There are deer tracks all around the seep, this is apparently a watering hole.

HNU readings maintained at about 0.1 to 0.4 (background). No change in explosivity or radiation, however, I do pick up an occassional whiff of landfill odor, nothing severe.

The sheen at the surface prevalent at Leachate Site \$2 is not present here. Also, this seep area has a green hue as opposed to the red hue noticed at Site L-2. There are no positive readings on the PID at the bubbling point at Site L-3. The bubbling is taking place at a lip in the soil surface, I cannot make direct access with the explosimeter to measure methane content since I do not have a probe extension similar to the PID.

As I think I said before, I cannot ascertain the rate of fluid influx to Site L-3. The ditch across the access road to the north of Site L-3 is flowing at a very slow rate, perhaps slower than 0.25 gpm, probably close to 0.1 gpm. There is a small amount of ponding here. The hue at this site is also green.

- 1150 The second ditch crossing the access road, located to the south of L-3 is also wet. There is no measurable flow rate, however, it is nevertheless wet in contrast to the dryness observed last month. Signs of adjacent dampness indicate that the "flow" is in recession.
- 1200 Near Well D-9, as usual, the landfill odor is very distinct in this area PID is 0.4 ppm in ambient conditions. Measurements in the crevice at the perimeter of the landfill in this area were up to 2 ppm using the PID.

Leachate Site L-4

There was evidence of distinct leachate flow at this site. There is a reddish-black oozy-like stain coming from the toe of the site in this area, proceeding to the southwest and following the haul road to the west for perhaps 75 to 100 feet until it comingles with leachate coming from Seep \$5. There is no measurable flow or visible evident flow in this seep or leachate Seep \$5. However, there was undoubtedly a fair amount of movement recently. Last month this area was dry. It is possible that leachate collection for chemical analyses could be performed here by digging a hole and allowing leachate to collect. However, I doubt if much could be collected in a days' time.

Background PID measurements is 0.4 ppm, Nominal increases at the leachate seep surface to perhaps .1 ppm above background at the most.

This seep is located along the south face of the landfill and is marked at the highest point of seep emergence by a stake labelled S #4, painted green and orange.

Leachate Seep Site L-5

This seep is also located along the south face of the landfill approximately 100 feet west of Site L-4. This is also marked by a stake with green and orange paint labelled L-5. The conditions here are similar to those witnessed at 'er(hate Seep Site L-4. There is a reddish-black discharge approximately six feet above the toe of the slope. There is no measurable or visible flow, however, although the seep discharge is obviously wet. Background PID measurement have increased to about 1.3 ppm in the area. I have no ready explanation for this, it does not seem to be the leachate. There is a white flag at the toe of the slope in the path of the

leachate, marked ERT1. Noteworthy along the slope to the west of L-5 is that there are several former seep discharge areas evidenced by red staining on the slope. These areas are dry now in contrast to the recently active areas described above.

Leachate Seep Site L-6

1220 - This site is located to the north of the southwest corner of the landfill along the western face. It is marked with a stake painted green and orange and labelled L-6. Recent leachate flow in this area is evident. The conditions are similar to those found at Sites L-4 and L-5. however, a slight trickling flow approximate': 10 feet immediately downgradient from the stake. I would estimate the flow rate at perhaps two pints per hour. There is a small puddle of standing leachate at the base of the This puddle measures approximately one foot in stake. diameter at a depth of perhaps two inches. There is a film or sheen at the surface of the leachate. difficult to estimate flow, however, I would estimate that there is a flow under the film similar to that described above.

There are four small flags in the leachate flow path downgradient from the stake about 15 feet. Three are yellow and are labelled C-6-11, C-6-7, and C-6-3 the fourth flag is labelled ERT-5.

Former seep areas adjacent to this seep are also evidenced by red staining on the slope. These areas do not appear to be active, at least within the recent past.

There are one or two additional seep outlets downgradient from Site #6 that are presently wet. However, no measurable flow is evident. At the toe of the slope downgradient from Site L-6 within the grassy area, there are small segregated pools of standing leachate, probably intermixed with runoff. Due to the high grass, it is difficult to quantify this area, however, I would estimate that the collection area is oval-shaped long access perhaps 75 feet parallel to the toe of the slope, short access perhaps 20 feet, overall fluid depth average linch. There are three additional yellow flacs on the slope further downgradient from Site L-6 labeled C-6-10, C-6-6, and C-6-2. There is at least two additional flags further downgradient along the leachate flow path.

As noted in other areas, the moisture staining adjacent to the active seep areas indicate recession.

Leachate Seep Site L-7

1250 - I tried to get to Site L-7 which is located on the west face of the landfill. This area is very heavily vegetated. There is an active seep located anomalously high on the landfill slope, I would estimate approximately 25 feet vertically from the top (perhaps 5 feet less). It is wet but there is no visible flow coming from it. There are residual leachate stains further upslope from this one these are, however, dry. I am trying to work my way downslope in the general direction of L-7. There are several leachate seep areas along this slope, which are located to the southeast of the "dead tree" at the toe of the west face of the landfill. These areas can at best be described as soggy with no visible flow. They are wet.

About midway down the slope and approximately 150 feet southeast of the fallen tree at the toe of the slope, there is a bubbling seep area that is actively omitting gas. Fluid flow is not measurable, at the most a trickle, if a collection could be excavated. The sound of bubbling and gas emissions in this area could be easily discernible above other noises. This site is about halfway down the slope.

Continuing further, I am looking for a marker indicating Site L-7. There are several very active gas vents in this area.

I see the stake marking Site L-7. It is just downgradient and approximately 100 feet south and west of the vents described above. The side of the slope leading to Site L-7 is muddy. The characteristic leachate red hue is absent here. If anything, there is a slight green hue.

At site L-7, there is a small puddle just downslope from the stake. There are occassional air bubbles coming out of the puddle which measures perhaps two feet in length by one foot in width with standing fluid approximately two to three inches in depth. There is no visible flow from the puddle, but there is a flow path continuing down the side of the slope to the toe of the slope. There are small puddle collection areas along this slope path. The seep here does not have the black-red coloration of seeps further to the south along this face and along the south

face. There is some sheen at the surface, but the overall hue, if any, is green.

The toe of the slope is located approximately 15 feet downgradient from L-7. The area can be describe generally as soggy with small collection areas for leachate and surface runoff. There are some reed patches.

PID readings at Site L-7 are at .6 ppm (surrounding conditions). No above background readings obtained at the fluid surface at L-7.

Going back up the slope to the top of the landfill at the air vents noted before, PID readings at the vents measured at 1.7 ppm. Ambient conditions measured at 0.6 ppm. Explosivity exceeds 50 percent after three seconds of exposure at the vent surface. In summary, the vent seems to be essentially all methane with perhaps one ppm other gases.

There is a small crevice area at the top of the landfill immediately upgradient from Site L-7. This crevice measures approximately 15 feet in length. There does not appear to be a great amount of positive air flow from the crevice which parallels the west face of the landfill. There are no positive PID readings inside the crevice nor are there positive explosimeter readings inside the crevice.

1330 - Moving along the top of the landfill in the vicinity of Well D-6, the landfill odor in this area is nauseating as usual. PID reading at 1 ppm. I am going to circle the northwest corner of the fill to access Site L-8.

At the northwest corner of the landfill, the run at the toe of the slope in this area is dry and shows only small signs of recent moisture. This is particularly in the small sediment fan at the outwash area of this gully. believe Site L-8 is in this area somewhere, if my A green and recollection serves me correctly. yellow-orange stake is to the immediate south of a stand of dead trees in an area that used to contain ponded This water is thickly vegetated with tall grass Water. and at best can be described as slightly moist to dry. The stake is marked Seep #12. This is not leachate seep I assume L-8 must be to the south of my Site #8. position.

About 50 feet south of the stake marking L-12, there is a small pond measuring about 15 feet by 6 feet, water in the pond is standing at a depth of about 3 to 4 inches. There are two used tires in the pond. To the immediate south of this ponded area there are some seep flow paths. The ground can be described as muddy, but a distinct flow is not evident.

PID remains at about .6 ppm background. There are several seeps in this area similar in flow characteristics to that of Site L-7 with small puddles, but no visible flow. I assume Site L-8 is in this vicinity somewhere, however, I do not see any stakes. I am now about 200 to 300 feet nor n of where I was when looking for Site L-7. If L-8 is in this area, I believe that is safe to assume that flow characteristics are similar to the rest of the seeps on this face of the landfill.

1355 - Having progressed further south along the west face of the slope, I have found Leachate Site L-8. There is a visible trickle coming from this seep. The seep can be described as having a dark green to blacking hue with a definite sheen at the surface. There are frogs living in this small puddle at the seep outlet. I would estimate the flow from this seep to be approximately 0.1 gallons per minute. The stake is marked with green paint and labelled L-8. The flow appears to continue downslope to the toe of the slope where it joins with other seep flows and collective surface runoff.

This site is located immediately upgradient from a dead tree stand marked further by some lying dead tree stumps at the toe of the slope. There appears to be a pond immediately behind the tree line. PID readings remain at background with no distinct increases at the leachate surface.

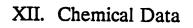
Leachate Seep L-1

1410 - I'm in the vicinity of Site L-1, in the reeds area on the west face of the "old fill". I have found a stake with green paint on the top, however, there is no writing on the stake. There is a puddle of leachate near the base of the stake measuring perhaps 1.5 feet in diameter by three to four inches in depth. There are bubbles coming from the base of the puddle. The bubbling is sporatic and not very violent. In volume, I would estimate approximately one bubble measuring one inch in diameter per five seconds.

There is a very small trickle flowing down slope from the puddle along the leachate flow path. The trickle is to small to visually quantify.

The drainage swale downgradient from Site L-1 is for all practical purposes dry. There is no flow in this swale. The sediment is moist to saturated, but there appears to be no channelling of runoff or leachate. Further north toward the New Jersey Power Company tower, downgradient from Site L-1, there is some pooling of leachate and/or runoff within the reeds in that area. The depth of the standing water in this area is probably no more than one inch.

- 1500 Have called Karen Wright at LMS and relayed the above information. Adequate decontamination and equipment packed up, I am leaving the site.
- 1515 Site secure.



CHEMICAL DATA

CHEMICAL DATA

- 1. Appendix A Summary of Shallow Monitoring Wells Priority Pollutants
- 2. Appendix B Summary of Deep Monitoring Wells Priority Pollutants
- 3. Appendix C Leachate Seep Quality Summary
- 4. Appendix D Leachate Soil/Sediment Quality Summary
- 5. Appendix E Summary of Previous Surface Water & Sediment Priority Pollutant Chemical Data
- 6. Appendix F Summary of Soil Data on Hand Augered Soil Samples
- 7. Appendix G Priority Pollutant Chemical Analyses of Soil Boring/Rock Coring Samples
- 8. Appendix H Summary of Priority Pollutant Chemical Analyses on Test Pits
- 9. Appendix I Priority Pollutant Chemicals Measured in Air Samples



SUMMARY OF SHALLOW MONITORING WELLS PRIORITY POLLUTANTS.

Combe Fill South Landfill

PARAMETER	S-1	S-2	S-3	S-4	S-5	<u>S-6</u>
DATE SAMPLED	9/4/85	9/5/85	8/29/85	9/4/85	8/28/85	8/28/85
VOLATILES, ppb		· .		٠		
Benzene	64.7	BM @ 4.4	80.2	BM @ 4.4	ND	BM @ 4.4
Chlorobenzene	ND	30.3	21.1	18.2	ND	ND
Chloroethane	ND	ND	BM @ 10	62.0	ND	ND
Chloroform	ND	ND	ND	ND	57.5	ND
1,1-Dichloroethane	65.2	. ND	51.4	BM @ 4.7	ND	ND
1,2-Dichloroethane	ND	ND	ND	6.10	ND	ND
1.1-Dichloroethylene	ND	ND .	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	BM @ 6	ND	ND	ND
Ethylbenzene	ND	ND	BM @ 7.2	ND	ND	ND
Methylene chloride ^a	56.0	4.44	18.4	8.2	4.67	4.67
Tetrachloroethylene	ND ·	ND	BM @ 4.1	ND	ND	ND
To luen e	1370	ND	68.2	ND	ND	ND
Trans-1,2-dichloroethylene	ND	ŃD	8.02	ND	ND	ND
Trichloroethylene	ND	ND	4.04	. ND	ND	ND
Vinyl chloride	ND	ND	BM @ 10	ND	ND	ND
ACID/PHENOLICS, ppb		•				
2,4-Dimethylphenol	ND	ND	ND	MD	ND	ND
2-Ni tropheno l	ND	ND.	ND	ND	ND	ND
Pheno 1	ND	ND	ND	BM @ 1.5	ND	ND

ND = Not detected.

BH = Below method detection limit.

^aCorrected based on analysis of QA/QC samples.

Appendix A (continued)

SUMMARY OF SHALLOW MONITORING WELLS PRIORITY POLLUTANTS

Combe Fill South Landfill

PARAMETER	<u>S-1</u>	S-2	S-3	S-4	S-5	S-6
DATE SAMPLED	9/4/85	9/5/85	8/29/85	9/4/85	8/28/85	8/28/85
BASE/NEUTRALS, ppb						
Bis (2-chloroethyl) ether	ND	ND	· ND	BM @ 5.8	ND	ND
Bis (2-ethylhexyl) phthalate	ND	BM @ 11	ND	ND	BM @ 10	ND
1,2-Dichlorobenzene	ND	9.77	ND	7.25	ND	ND
1,4-Dichlorobenzene	ND ·	39.4	ND	10.1	ND	ND
Di-ethyl phthalate	ND	ND	10.2	ND	ND	ND
Di-n-butyl phthalate	ND	BM @ 11	NO	BM @ 10	ND	ND
Di-n-octyl phthalate	ND	ND	ND	ND	ND	ND
Isophorone	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	3.16	ND	ND	ND
N-nitrosodiphenyl amine	ND	ND	ND	ND	ND	ND
PESTICIDES/PCBs, ppb	ND	ND	ND ND	ND	ND	ND
METALS, ppm		•	•			
Beryllium	MD	ND	BM @ 0.002	ND .	ND	NO
Cadmium	ND	ND	ND	BM @ 0.003	ND	ND
Chranium	ND	BM @ 0.01	0.02	0.03	BM @ 0.02	ND
Copper	0.01	0.01	0.03	0.02	0.01	0.04
	M @ 0.01	0.014	0.022	0.009	0.028	0.017

ND = Not detected. BM = Below method detection limit.

Appendix A (continued)

SUMMARY OF MONITORING WELL SAMPLES

Combe Fill South Landfill

PARAMETER	S-1	S-2	S-3	S-4	S-5	S-6
DATE SAMPLED	9/4/85	9/5/85	8/29/85	9/4/85	8/28/85	8/28/85
METALS, ppm					:	
Mercury	ND	ND	BM P 0.0002	ND	BM @ 0.0002	BM @ 0.0002
Nickel T	ND	BM @ 0.01	0.02	0.03	ND	BM @ 0.009
Selenium	ND	ND	ND	ND	BM @ 0.005	ND
Silver	BM @ 0.01	ND	BM @ 0.009	BM @ 0.01	ND	ND
Thallium,	BM @ 0.005	ND	BM @ 0.005	ND	ND	ND
Zinc	0.05	0.10	0.24	0.04	ND	0.04
MISCELLANEOUS, ppb						
Cyanides	ND	ND	ND	ND	. NO	ND
Pheno 1 s	270	ND	ND	ND	NO	ND

ND = Not detected. BM = Below method detection limit.



SUPPLARY OF PRIORITY POLLUTANTS DEEP MONITORING WILLS

I'ARAMETER	D-1	D-2	0-3	<u> </u>	<u> 0-5</u>	D-6	D-7	9-8	D-9	DM-S	DW-4
MATE SAMPLED	8/28/85	8/28/85	9/4/85	8/28/85	8/28/85	8/29/85	9/4/85	5/4/85	9/4/85	9/5/85	9/5/R5
VOLATILES, ppb					٠.						
Benzene	MO	MD	MD	NO	16.9	39.1	66.4	31.5	18.6	ND	252
Chlorobenzene	MO	ND	ND	ND	ND	BM P 6	9.88	10.8	ND	MD	BH P 6
Chloroethane	ND	ND	ND	ND	∮ ND	ND	22.5	74.3	84 P 10	ND	ND
Chloroform	MD	209	ND	82.6	NO CH	ND	MO	ND	MD	ND	155
1.1-Dichloroethane	NO	6.41	MO	ND	10.6	BM P 4.7	ND	14.8	30.2	ND	ND
1.2-Dichloroethane	MD	7.98	ND	ND	40.5	37.2	ND	11.2	4.54	ND	14.2
1.1-Dichloroethylene	MD	6.41	NO	ND .	· ND	MD	NO	ND	ND	ND	ND
1.2-Dichloropropane	NO	ND	MD	MD	ND	MD	MO	BN P 6	ND	ND	ND
Ethylbenzene	ND	MD	NO	ND	NO	MD	34.2	11.7	NO	ND	ND
Methylene chloride®	5.92	176.07	16.0	ND .	9.77	ND	20.0	18.6	12.6	9.3	20.6
Tetrachloroethylene	NO	14.3	NO	NIT .	6.89	BM 0 4.1	MO	ND	ND	MD	5.58
Toluene	NO:	MD	ND	ND	ND	ND	1140	MD	ND	ND	NO
Trans-1.2-dichloroethylene	MD	MD	ND	5.40	25.8	47.5	MO	MD	ND	ND	17.5
Trichloroethylene	MD	8.34	MD	ND	2.72	26.0	ND	MD	ND	KD	56.8
Vinyl chloride	MO	MD	MD	MO	MD	BM # 10	ND	MD .	MD	MD	8M P 10
ACID/PHENOLICS, ppb									a ;		
2,4-Dimethylphenol	MO	MD	ND	MD	NO	MD	MO	3.12	MD	MD	MO
2-Nitrophenol	HD	MD	MD	MD CON	ND	NO ON	NO	BN 9 3.7	NO	ND	MD
Phenol	MD	2.35	WD	NO	2.75	NO	NO	ND	ND	ND	ND
BASE/NEUTRALS, ppb											
Bis (2-chloroethyl) ether	NO	. NO	MO	ND	ND	MD	MD	84 0 5.9	ND	MD	NO
Bis (2-ethylhexyl) phthalate	DM 0 11	ND:	NO	BH P 10	. ND	DM # 11	MD	BM P 10	BH # 10	ND	MD
1.2-Dichlorobenzene	NO	NO	NO	MD.	ND	MD	MD	5.58	1.92	MD	NO
1.4-Dichlorobenzene	NO	BH 9 4.6	ND	ND	BM P 4.5	KD	MO	14.2	NO	ND	MD
Di-ethyl phthalate	ND	MD.	NO	ND ND	BH 0 10	MD	MD	BM 9 10	ND	ND	NO
Di-n-butyl shthelate	BM 9 11	ND:	MD	8M P 10	BM 9 10	ND	NO	BM P 10	BM P 10	ND	BM P 10
Di-m-octyl phthalate	BH 9 11	ND	ND	MD	MD	ND	NO	ND	ND	ND	MD
Isophorone	MD	21.9	NO	MD	MD	ND	ND	ND	ND	ND	MD
Maphthalene	NO	ND	NO	ND	ND	ND	MD	3.24	ND	ND	ND
M-nitrosodiphenylanine	HD	MD	MO	MD	MD	MD	MD	BM P 2	MD	ND	NO

^{*}Corrected based on analysis of QA/QC samples.
NO = Not detected.
RM. = Below method detection limit.

Appendix B (continued)

SIMPLARY OF PRICEITY POLLUTANTS OFFP MONITORING WELLS

PARAMETER	0-1	D-2	D-3	D-4	D-5	D-6	0-7	D-8	D-9	DW-2	
DATE SAMPLED	8/28/85	8/28/85	9/4/85	8/28/RS	8/28/85	8/29/85	9/4/85	9/4/85		9/5/85	DN-4
PESTICIDES/PCBs, ppb	MO	MD	ND	MD	MD	ND	ND	ND	ND		9/5/85
PETALS, ppm								****		ND	MD
Arsenic Beryllium Cadnium Chromium Copper Lead Mercury Nickel Selenium Silver Thallium Zinc MISCELLANEOUS, ppb	NO ND ND 0.04 0.009 0.0002 ND ND ND ND ND	ND ND ND O.007 BM & O.005 O.0002 ND BM & O.005 ND ND	0.01	ND ND ND ND MD 0.006 M 0.005 M 0.0002 ND ND ND ND	BM © 0.03 ND ND ND BM © 0.006 0.008 BM © 0.0002 ND ND ND ND ND	ND ND	ND ND 0.02 BI 0.007 BI NO 0.02 NG BM # 0.01 BM	ND ND ND ND ND M & 0.009 M & 0.005 ND ND ND ND ND	0.009 0.014 ND ND ND	ND ND ND 8M © 0.009 0.011 NO ND ND ND ND MD BM © 0.005	ND ND ND ND ND ND ND ND ND ND ND ND
Cyanides Phenois	NO NO	29.5 MD	ND ND	MD MD	MD MD	ND ND	NO 428	ND: ND	ND ND	ND ND	MD MD

ND - Not detected. BH - Below method detection limit.

W-(

Appendix C.

LEACHATE SEEP QUALITY SUMMARYA, b

PRIORITY POLLUTANT			LEACHA	TE SEEP		
CONTAMINANTS	1-1	L-2	L-3	L-6.	L-7	L-8
Volatiles, ppb	69	15	162°	103¢	1084c	1370
Acid/Phenolics, ppb	3	1	· 0	7	0	0
Base/Neutrals, ppb	19	34	48	. 33	2	71
Pesticides/PCBs, ppb	. 0	0	0	0	0	0
Metals, ppm	0.064	0.070	0.110	0.155	3.180	0.680
Cyanides, ppb	0	47	31	38	28	0
Phenols, ppb	100	0	257	247	418	254

a Statistical calculations assume BM = 1/2 detection limit and ND = 0. b Concentrations adjusted in accordance with QA/QC review. CAverage of data from 13 August 1985 and 17 October 1985.

Appendix D.

LEACHATE SOIL/SEDIMENT QUALITY SUMMARY &, b

PRIORITY POLLUTANT				LEACHAT	ESEEP	•		
CONTAMINANTS	[-]	L-2	L-3	L-4	L-5	L-6	L-7	<u>L-8</u>
Volatiles, ppb	0	. 0	0	0	0	0	0	23
Acid/Phenolics, ppb	0	0	0	0	0	0	0	0
Base/Neutrals, ppb	288	428	1435	190	186	416	69,836	6536
Pesticides/PCBs, ppb	0	0	0	0	0	0	0	0
Metals, ppm	48.0	236.9	56.7	240.9	188.8	76.	2 168.1	458.7
Cyanides, ppb	0	0	0	0 .	0	0	0	0
Phenols, ppb	0	0	0	0	0	. 0	0	0

a Statistical calculations assume BM = 1/2 detection limit and ND = 0. b Concentrations adjusted in accordance with QA/QC review.

SUMMARY OF PREVIOUS SURFACE WATER AND SEDIMENT PRIORITY POLLUTANT CHEMICAL DATA

STATION LOCATION	STATION NUMBER(S)	SAMPLE TYPE	AVERAGE TOTAL VOLATILES (ppb)	AVERAGE TOTAL ACID/PHENOLS (ppb)	AVERAGE TOTAL BASE/NEUTRALS (ppb)	AVERAGE TOTAL PESTICIDES/PCBs (ppb)	AVERAGE TOTAL METALS (ppm)	
WEST BRANCH TROUT B	ROOK	·			·			
SE Corner of Landfill	G, H	Water	64	0	5	1	0.1025	
Above Bridge	E	Water	NR	- NR	NR	· NR	0.0685	>
N of Tingue	A	Water	NR	NR	NR	NR	0.057	
Upstream of Tingue	J, M, N	Water	15	0	0	0	0.0910	
Tingue Driveway	Q	Water Sediment	1717 457	. 0	106 0	0 0	0.1185 61.050	
Inflow to Pond	D	Water	NR	NR	NR	NR	0.0415	
Trib. to W. Br, Upstream of Pond	P	Water Sediment	5 75	0	0 15,000	0 5,000	0.5779 171.400	
EAST BRANCH TROUT B	ROOK							
Headwaters	F, L	Water	152	0	90	0	0.1723	

Appendix continued)

SUMMARY OF PREVIOUS SURFACE WATER AND SEDIMENT PRIORITY POLLUTANT CHEMICAL DATA

STATION LOCATION	STATION NUMBER(S)	SAMPLE Type	AVERAGE TOTAL VOLATILES (ppb)	AVERAGE TOTAL ACID/PHENOLS (pdb)	AVERAGE TOTAL BASE/NEUTRALS (ppb)	AVERAGE TOTAL PESTICIDES/PCBs (ppb)	AVERAGE TOTAL METALS (ppm)	
EAST BRANCH (Cont.) NE of Township Line	C	Water	NR	NR	NR	NR	0.054	
Below Property Boundary	K	Water	131	0	0	0	0.0610	
Trib. to E. Br, Above Parker Rd	. R	Water Sed iment	10 76	0 0	0 24,800	0 0	1.1392 339.950	A-4
TROUT BROOK (MAIN S	EGMENT)							
30-yd below Confluence of Branches	8	Water	NR	NR	NR	NR	0.0300	
100-yd upstream of Long Hill Rd.	S	Water Sed iment	0 23	0	0 41	0	0 157.250	
50-yd upstream of Bridge at Ranger Station	T	Water Sediment	1 8	0	0	0	0.0040 111.450	
100-yd upstream of Black River	U	Water	1	0	0	0	0.0025	

V-10

Appendix E (continued)

SUMMARY OF PREVIOUS SURFACE WATER AND SEDIMENT PRIORITY POLLUTANT CHEMICAL DATA

Combe Fill South Landfill

STATION LOCATION	STATION NUMBER(S)	SAMPLE TYPE	AVERAGE TOTAL VOLATILES (ppb)	AVERAGE TOTAL ACID/PHENOLS (ppb)	AVERAGE TOTAL BASE/NEUTRALS (ppb)	AVERAGE TOTAL PESTICIDES/PCBs (ppb)	AVERAGE TOTAL METALS (ppm)
BLACK RIVER						. 0	0.0025
300-yd Upstream of Trout Brook	٧	Water Sediment	0 21	0 0	928	. 0	124.200
100-yd Downstream of Trout Brook	¥	Water	1	0	0	0 .	0.0002

NR = Not run.



SUPPRRY OF SOIL DATA ON HAND-AUGERED SOIL SAMPLES

Combe fill South Landfill

PAWETER	FIELD A WHITE	TITLD A A TONTYON COMPOSITE	FIFED A B TRATTON COMMISSIVE	FIELD A (I/C 5) B HORIZON	FIELD A TINC 67 A HIREZON	FIELD B (IN: 5) B HOREZON	FIELD B T(OC A) A HORIZON	FIELD B	TIELD B X (44)761 COMPOSITE	FIELD A B HORTZON COMPOSITE	FIELD C A HIRTZON COMPUSITE	FIELD C IF HURTZIN COMMISTIE
DATE SAMPLED	0/21/85	8/22/85	8/22/A5	B/21/A5	8/21/05	A/77/A5 .	A/27/RS	8/22/85	B/22/A5	0/22/85	0/23/85	8/23/85
VOI ATILES®, ppb											-, -, -, -, -, -, -, -, -, -, -, -, -, -	
Hethylene chloride Tetrachloroethylene	569 ND	960 ^(b) 140	HOb HOb	MD MD	Mp Po	NDb 4c	Jp°c HDp	MD 6b	Jp°c N∪p)h_c	S NOp	MDp 1
ACID/PHENOLICS, pob										-		
Pent ach l'oropheno l	NO:	150°	10	MD	, ND	10	NO	ND.	Ю	ю	ю	10
BASE/NEUTRALS, ppb			•.			•						
Benzo (A) pyrene Dis (2-ethylhexyl) phthalate	1500 310c	ND 2700	150°C	10 960	ND 770	110°	110°	ND 150°	ND 110°	NO 150°C	330c	NO 240 ^C
Di-n-butyl phthalate Di-n-octyl phthalate	160p°c	120c 10	10 10	MD MD	10 10	MD MD	NO NO	10 10	110 ^c	10 10	NO NO	NO NO
PESTICIDES/PCBs, ppb												
4,4'-00E 4,4'-00T	10 10	10 10	10 - 10	10 10	11 17	ND ND	10 10	MD MD	NO NO	HD	HO HO	NO NO
ETALS, ppm										•		
Arsenic Beryllium Cadnium Dironium Copper Lead Percury Nickel Silver Thallium Zinc	12 10 4.7 33 37 10 15 10 48 ^C	18 3.9 3.9 57 57 27 10 17 10 3.6	26 1.6 1.9 50 35 14 10 14 80 5.1	29 3.3 3.1 46 74 17 10 21 10 4.5	20 1.7 2.7 25 20 2 0.1 13 10 10	26 1.1 2.0 22 40 14 10 41 10 8310	18 1.4 4.0 22 22 25 0.1 13 10 10	18 1.2 2.4 21 26 26 0.1 9.0 NO	21 1.5 2.8 21 24 29 0.1 14 80 80	23 1.0 3.2 27 22 11 0.1 12 10 10	12 1.0 2.0 12 15 16 0.2 10 10 10	9.7 1.0 2.1 9.1 7.0 9.7 0.1 10 10
Cyanides Phenols	NO NO	160 160	10 10	ND NO	ND ND	10 10	ND 1000	NO NO	HD	ND 1200	10 10	MO MD

*Data has been adjusted to reflect concentrations in QVQC field and trip blank samples.

DAIso Found in method blank.

CEstimated value. Value is below method detection limit.

HD = Mit detected.

Appendix G.

PRIORITY POLLUTANT CHEMICAL ANALYSES OF SOIL BORING/ROCK CORING SAMPLES

	ZYMDLE IN	TER SB-Z ITERVAL (ft)	PIEZOME	TER 58-3 TERVAL (ft)	PIEZON	ETER SB-4
DTOTMELEDS	36-35	42-48	12-14	58-30	14-16	TERVAL (ft)
DATE SAMPLED	11/21/84	11/21/84	11/15/84	11/15/84	11/27/84	11/27/84
VOLATILES, pob						44/6//04
Carbon tetrachloride Chloroform Methylene chloride Tetrachloroethylene Toluene	NO 558 3324 NO 395	NO 658 3864 NO	NO NO NO 805	350 530 515 ND	ND 5995 ND . 1395	NO 5595 NO NO
ACID/PHENOLICS, ppb	123	495	955	465	2995	NO
Pentachlorophenol Phenol	NO NO	BM # 825 NO	BM # 825 BM # 825	8M 9 825 ND	BM # 825	ND
BASE/NEUTRALS, ppb					•	, NO
Butyl benzylphthalate Diethÿlphthalate Di-n-buylphthalate Phenanthrene	350 BM © 330 500 8m © 330	ND ND 720 ND	MD NO 6000 NO	NO NO 450 NO	ND NO 560 NO	NO ND 570 NO
PESTICIDES/PCBs. ppb	ND	NO	ND	NO.	110	NC)
METALS, ppm				•		
Arsenic Cadmium Chromium Copper Rickel Zinc RISCELLANEOUS, ppb	2.6 1.1 NO 3.9 NO 16.0	2.5 4.7 MD 120.0 5.0 61.0	2.9 3.7 NO 56.0 ND 91.0	2.4 2.4 5.9 31.0 NO	NO. 1.1 NO 20.0 6.4 13.0	NO 3.4 NO 71.0 14.0 38.0
Cyanides Phenols	NO NO	NO NO	ND ND	NO NO	ND ND	ND

BM = Below method detection limit. NO = Not detected.

⁴Data have been adjusted to reflect contamination in QA/QC field and trip blank samples (see Appendix CC).

Appendix H.

SUMMARY OF PRIORITY POLLUTANT CHEMICAL ANALYSES ON TEST PITS

Combe Fill South Landfill

PARAMETER	TP-1 COMPOSITE 0-9 ft	TP-1 DISCRETE	TP-2 COMPOSITE	TP-3 COMPOSITE
DATE SAMPLED	8/27/85	9-11 ft 8/27/85	. 0-12 ft 8/27/85	0-12 ft 8/27/85
VOLATILES, ppb		0,2,703	0/2//03	6/2//63
Tetrachloroethylene	. NDa	MDs	NDa	МОа
ACIDS/PHENOLICS, ppb	ND	ND	ND	ND
BASE/NEUTRALS, ppb				
Bis (2-ethylhexyl) phthalate	120b	370b	1300	ND
PESTICIDES/PCBs, ppb				
Aldrin Dieldrin	ND ND	ND ND	132 76	ND ND
METALS, ppm				
Arsenic Beryllium Cadmium Chromium Copper Lead Nickel Zinc	71 1.5 2.9 22 34 ND 7.7 47¢	52 1.5 ND 19 26 ND 7.2 38 ^c	42 1.5 13 24 37 30 12 148 ^c	38 1.0 1.3 16 20 10 7.5 50¢
MISCELLANEOUS, ppb				
Cyanides Phenols	ND ND	ND ND	ND NO	DN 00

aData corrected based on QA/QC review. bEstimated value; value is below method detection limit. CValue is estimated because of interferences. ND = Not detected.

PRIORITY POLLUTANT CHEMICALS MEASURED IN AIR SAMPLES
AT COMBE FILL SOUTH LANDFILL a, b

PRIORITY POLLUTANT	UPWI	ND (μg/m³)	ON-SITE	E (µg/m³)	DOWNWI	
CHEMICAL	AVE.		AVE.	RANGE	AVE.	RANGE
Volatiles					_	
Benzene	. 0	0	16	0-144	. 0	0
E thy i ben zene	. 6	0-10	39	0-276	8	0-13
Methylene chloride	11	0-30	9	0- 30	10	0-30
Tetrachloroethylene	4	0- 6	8	0- 30	8	0-18
Toluene	26	20-30	48	0-216	33	22-47
Trichloroethylene	<1	0- 1	5	0- 30	0	0
Base/Neutrals				0 0 014	0.005	0-0.011
Diethyl phthalate	0.004	0.003-0.005	0.005	0-0.014		0-0.002
Di-n-butyl phthalate	0.001	0-0.003	0.0015	0-0.007	0.001	0-0.002
Metals		_	0.004	0 0 060	0.034	0-0.061
Antimony	0	0	0.004	0-0.069	0.002	0.0015-0.0029
Beryllium	0.004	0.0034-0.0051	0.001	0-0.0024		0-0.039
Cadm i um	. 0.005	0-0.0139	0.002	0-0.0089	0.002	′0
Chronium	0	• 0	0.014	0-0.2563	0	_
Copper	0.147	0.057-0.223	0.126	0.036-0.406	0.117	0.047-0.164
Lead	0.279	0.081-0.611	0.158	0-0.438	0.293	0.181-0.448
Nickel '	0.012	0-0.025	0.009	0-0.029	0.036	0.015-0.066
Zinc	9.3	8.6-9.9	1.2	0-4.5	3.3	0-7.8

aContaminants found at greater than BM (i.e., greater than the detection level) at one or more stations based on QA/QC corrections. QA/QC corrections include subtracting filter blank data given on Table CC-26.

bStatistical averages assume BM = 1/2 the detection limit and ND = 0.

